OPERATION, SAFETY AND MAINTENANCE MANUAL

CINCINNATI
90-350 PROFORM
HYDRAULIC PRESS BRAKE

CINCINNATI

CINCINNATI INCORPORATED
CINCINNATI, OHIO 45211

EM-506 (N-07/03)

COPYRIGHT © 2003
CINCINNATI INCORPORATED

PROFORM PRESS BRAKE CONTENTS

INTRODUCTION

SECTION 1 IDENTIFICATION

SECTION 2 INSTALLATION

UNLOADING 2-1
LIFTING AND MOVING 2-1
FOUNDATION 2-1
ERECTION 2-1
MACHINES SHIPPED WITH BED REMOVED 2-2
CLEANING 2-2
LEVELING 2-3
HYDRAULIC RESERVOIR 2-4
LUBRICATION 2-4
ELECTRICAL CONNECTION 2-4

SECTION 3 SAFETY

SAFETY RECOMMENDATIONS FOR PRESS BRAKE OPERATION 3-1
LOCKOUT / TAGOUT – POTENTIAL HAZARDOUS ENERGY 3-1
FOR SAFE OPERATION OF YOUR CINCINNATI PRESS BRAKE 3-2
RULES FOR SAFE OPERATION 3-2
INSTALLING, REMOVING, AND TRANSFERRING TOOLING (DIES) 3-3
SAFETY SIGNS 3-4
PRESS BRAKE OPERATOR SAFETY GUIDELINES 3-5
SAFETY MAINTENANCE CHECK 3-6

SECTION 4 SPECIFICATIONS

PERFORMANCE AND RATINGS 4-1
SPECIFICATIONS 4-2
PRINCIPLE OF OPERATION 4-2
DEFINITION OF TERMS 4-2
CAPACITIES 4-3
PUNCHING CAPACITY 4-3
STRIPPING CAPACITY 4-4
ECCENTRIC LOAD CAPACITY 4-4
OFF-CENTER LOAD CAPACITY 4-5

SECTION 5 SETUP AND USE

PRESS BRAKE TOOLING 5-1
TYPES OF DIES 5-1
TOOL INSTALLATION 5-2
GAGING – OPTIONAL BACKGAGE 5-5
CAPACITY 5-5
GAGE ASSEMBLY 5-5
ADJUST GAGE FINGER POSITION 5-7
PROGRAM GAGE POSITIONS 5-8
WORK SUPPORTS 5-8
OPERATING TECHNIQUES 5-9
TOOLING AND SETUP 5-9
RUNNING 5-9
SPEED CHANGE/FORMING SPEED 5-9
GAGES 5-10
REMOVING TOOLING 5-10

SECTION 6 MACHINE CONTROLS

PC CONTROL 6-1
LCD TOUCHSCREEN DISPLAY 6-1
FLOPPY DISK DRIVE 6-1

COPYRIGHT © 2003
CINCINNATI INCORPORATED

CD-ROM DRIVE 6-1
SWITCHES AND BUTTONS 6-1
OPERATOR STATIONS 6-2
PALMBUTTON STATION 6-2
FOOTSWITCH 6-3
ELECTRICAL ENCLOSURE 6-3
MAIN DISCONNECT SWITCH 6-3
GROUND CONNECTED LIGHT 6-4
POWER SUPPLIES OPERATIONAL LIGHT 6-4
ETHERNET CONNECTION 6-4
UPS (UNINTERRUPTIBLE POWER SUPPLY) 6-5

SECTION 7 OPERATION

SEE SUPPLEMENT MANUAL EM-508 OR ONLINE HELP 7-1

SECTION 8 OPTIONS

ADDITIONAL OPERATOR STATIONS 8-1
AUTO CROWN 8-1
BACKGAGES 8-1
CNC BACKGAGE 8-1
CNC HEAVY DUTY BACKGAGE 8-2
CNC PLATE BACKGAGE 8-2
4X BACKGAGES 8-3
SPECIAL STEP PROGRAMMING 8-4
MANUAL FRONTGAGES 8-4
POWER CLAMP 8-5
PRESENCE SENSING SAFE-GUARDING INTERFACE 8-5
PROGRAMMABLE FOOTSWITCH 8-6
ETHERNET CONVENIENCE OUTLET 8-6
OIL COOLER 8-6
OIL HEATERS 8-6
OIL LEVEL/TEMPERATURE SWITCH 8-6

SECTION 9 MAINTENANCE & ADJUSTMENTS

LOCKOUT / TAGOUT PROCEDURE 9-1
LUBRICATION 9-1
BACKGAGES 9-2
HYDRAULIC OIL 9-4
OIL FILTER 9-5
CHECKING & SETTING HYDRAULIC PRESSURES 9-6
COUNTERBALANCE PRESSURE 9-6
MAIN RELIEF PRESSURE 9-7
AIR FILTER / BREATHER 9-7
HYDRAULIC UNIT OPTIONS 9-8
OIL COOLER 9-8
OIL HEATERS 9-8
OIL LEVEL / TEMPERATURE SWITCH 9-8
CYLINDERS 9-8
MOTOR / PUMP 9-8
VALVES 9-8
SWIVEL END-GUIDE BEARING 9-9
RAM LINEAR TRANSDUCER (POTENTIOMETER) ADJUSTMENT 9-9
MACHINE LEVEL 9-10
ELECTRICAL 9-10
BACKGAGE INSTALLATION 9-10
CNC BACKGAGE (OPTIONAL) 9-10
CNC HEAVY DUTY BACKGAGE (OPTIONAL) 9-11
CNC PLATE BACKGAGE (OPTIONAL) 9-13
CNC 4X BACKGAGE (OPTIONAL) 9-13
CARRIAGE ADJUSTMENT 9-15
TROUBLESHOOTING 9-15
LCD DISPLAY ERROR MESSAGES 9-16
POWER-UP TEST ON CPU BOARD 9-16
ON POWER-UP 9-16
USER INITIATED SELF-TEST 9-16
MAINTENANCE CHECKLIST 9-18

SECTION 10 SERVICE AND PARTS

ORDERING REPAIR PARTS 10-1
RETURNING PARTS FOR CREDIT 10-1
SERVICE 10-1
TECHNICAL TRAINING 10-1

INTRODUCTION

CINCINNATI PROFORM

The PROFORM is a hydraulically driven press brake. Linear transducers (potentiometers) constantly monitor the bed-to-ram position, feeding this information to the Control. The Control is a self-contained industrial PC with an integrated LCD touchscreen display, floppy disk drive, CD-ROM drive, Operator Control keyswitch and main drive START/STOP buttons. The program controls the vertical movement of the ram and movement of the backgage. After a program is entered either the machine can be run or the program stored in internal memory. The PROFORM PC Control allows an individual job to be quickly set-up and run as well as complicated, multi-bend parts or long run jobs. After a program is run, the program and related setup information can be saved for future use.

PART QUALITY

The following factors affect part quality:

- Press Brake condition and repeatability
- Operator ability
- Condition of tooling
- Quality of material.

CINCINNATI machines are designed to be rugged and durable. However, improper adjustment or lack of maintenance can reduce the quality of parts produced on that machine. These factors may also affect the repeatability of the machine. A machine that will not consistently reverse at the same point or will drift out-of-level will not produce uniform parts.

Operator ability obviously affects part quality and production rate. CINCINNATI INCORPORATED provides many design features in the machine and optional accessories to aid even the most inexperienced operator to produce consistent parts. The operator or setup person must select the best tooling from those available. The type of gaging, material supports or other special equipment will affect how the part is produced. Selecting the proper bend sequence is important to obtain quality parts and for operator safety. CINCINNATI offers both Operator and Maintenance training programs at our factory to address these problems. This training may cover subjects from the basics of forming to the use of the machine's computer controls.

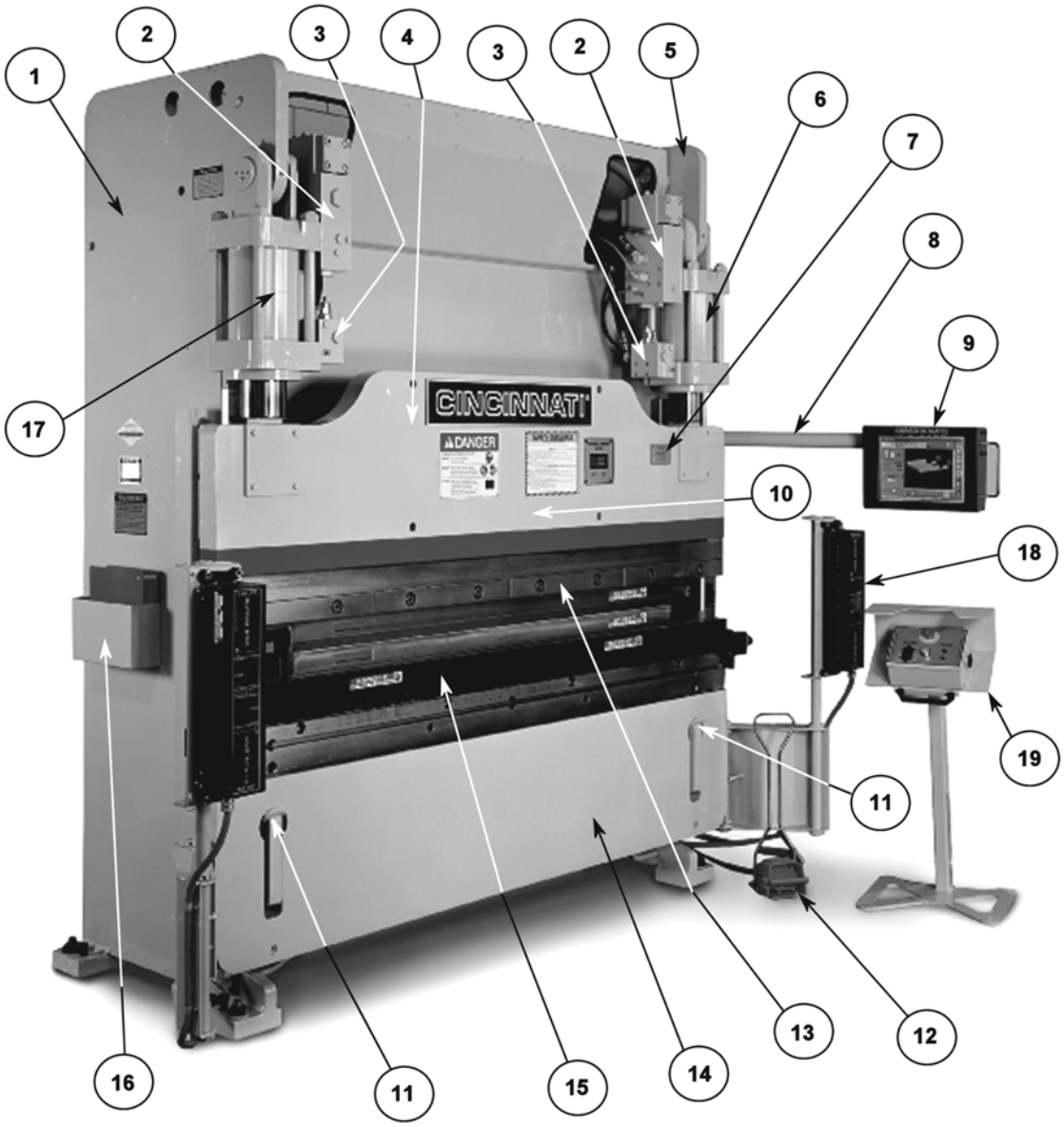
Worn, damaged or poor quality dies or filler blocks can directly affect part quality. Using good tooling, selecting the correct tooling for the job and setting them up properly can produce good part quality.

Quality of material can affect angular tolerances of the bend. This is due to normal material thickness variations found in commercial steels as well as hard and soft spots in the metal. Using a good grade of material and the proper tooling setup will minimize the variations.

The contents of this manual will assist in understanding the operation, safe use and maintenance of the CINCINNATI PROFORM Hydraulic Press Brake. Read this manual before operating the press brake.

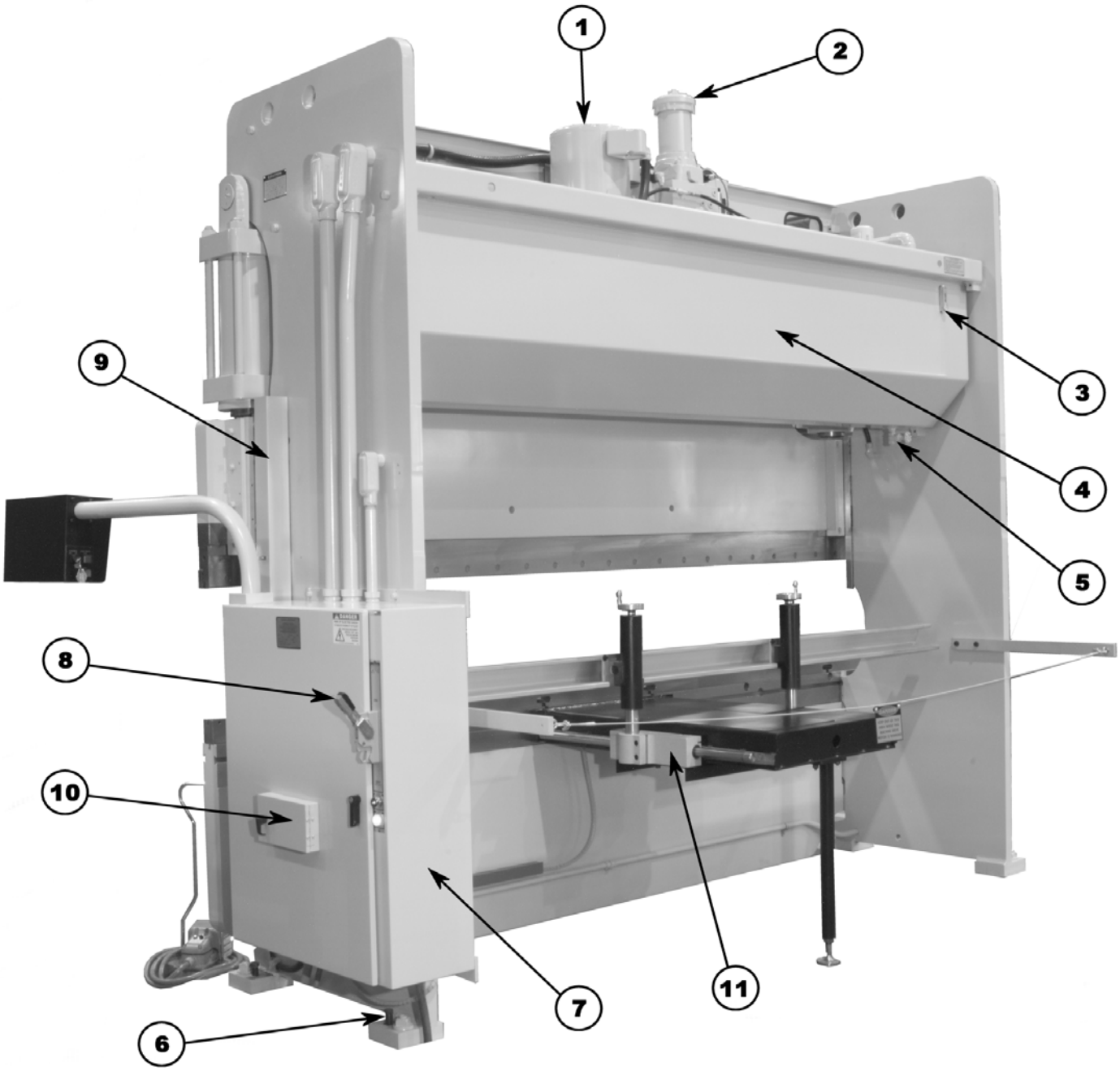
SECTION 1 IDENTIFICATION

90-350 PROFORM PRESS BRAKE



1. LEFT HOUSING
2. CYLINDER MANIFOLD & VALVES (2)
3. COUNTERBALANCE MANIFOLD & VALVES (2)
4. RAM
5. RIGHT HOUSING
6. RIGHT CYLINDER
7. CAPACITY PLATE
8. PENDANT ARM
9. CONTROL PENDANT
10. RAM MOUNTED PALMBUTTON STATION (Not Shown)
11. BED SHOE (2)
12. FOOTSWITCH
13. DIE CLAMPS
14. BED (Optional AUTO CROWN BED not shown)
15. CROWNABLE FILLER BLOCK (Optional)
16. OPERATION / MAINTENANCE MANUAL POUCH
17. LEFT CYLINDER
18. PRESENCE SENSING DEVICE (Optional)
19. PEDESTAL-MOUNTED PALMBUTTON STATION (Optional)

FIGURE 1-1 Front View



1. DRIVE MOTOR AND PUMP
2. OIL FILTER
3. OIL SIGHT GAGE AND THERMOMETER
4. HOUSING BRACE / HYDRAULIC RESERVOIR
5. RESERVOIR DRAIN VALVE
6. LEVELING SCREW (4)
7. ELECTRICAL ENCLOSURE
8. MAIN DISCONNECT SWITCH
9. LINEAR TRANSDUCER (Potentiometer) GUARD (2)
10. FLOPPY DISK & CD-ROM DRIVES
11. CNC BACK GAGE (Optional)

FIGURE 1-2 Rear View

SECTION 2 INSTALLATION

UNLOADING

After receiving your CINCINNATI PROFORM, carefully remove the contents of the one or more boxes shipped with the machine. All of the machine's optional accessories and small parts are in these boxes, such as wrenches and leveling shims. Check all of these parts with the packing list. Claims for shortages should be made within ten days.

Most machines are shipped assembled on skids. Some of the longer length machines are shipped with the bed removed and bolted to the rear of the housings and some are shipped disassembled.

Remove all shipping paper from the wrapped parts of the machine. Leave the shipping skids, bed and ram bracing attached to the machine until it has been moved to its final location.

LIFTING AND MOVING

The machine can be handled by a crane(s) of sufficient capacity with chains or cables of adequate size (refer to American National Standards Institute B30.9). Shipping weight of the machine is listed on the Bill of Lading for the shipment. Check this weight carefully before lifting or handling. Use chains or cables adjusted to the proper length for even lifting. The chains or cables should be long enough to minimize the side loading on the housings. If short cables are used, fit a spreader beam between the housings near the lifting holes. A typical hitch is shown in Figure 2-1.

If your crane does not have sufficient capacity, or no crane is available, rig the machine into final location. Leave the bed attached to the back of the housing when rigging the longer length machines into position.

! WARNING !

BE EXTREMELY CAREFUL TO KEEP THE MACHINE SUPPORTED EVENLY AND TO GUARD AGAINST TIPPING.

CINCINNATI INCORPORATED recommends that professional riggers be employed to handle the machine. This is to guard against injury to personnel and prevent damage to the machine. If jacks are used to lower the machine onto the foundation bolts, care should be taken to prevent twisting of the machine.

FIGURE 2-1 Lifting the machine

FOUNDATION

A PROFORM Hydraulic Press Brake must be provided with a rigid foundation to ensure that alignment of the housings and cross framing members is maintained. The foundation must support the weight of the machine without cracking or settling out-of-level.

For details of the foundation recommended for your machine, refer to the Foundation Plan drawing. It is advisable, particularly in localities where unusual soil conditions may exist, to have your Foundation Plan approved by a local registered civil engineer.

As a final check before locating the PROFORM Hydraulic Press Brake on the foundation, see that the anchor bolts in your foundation match the bolt hole spacing in the housing feet. Check the width of the bed pit (when required) and the distance from the centerline of the front foundation bolts to the front edge of the bed pit. They should agree with the dimensions shown on the Foundation Plan drawing.

ERECTION

Open the shim packages shipped with the machine and remove the thickest shim from each package. Place one

shim at each foundation bolt location. The top surfaces of the shims must be about level. Thinner shims can be used to obtain this level condition. Place a 1/8" (3.2mm) thick shim at the front feet locations to deliberately make the front of machine high. It is easier to raise the rear housing feet to obtain final leveling when the PROFORM Hydraulic Press Brake is in position. As an option, it is recommended that a transit is used to establish that all four pads are in the same plane.

Lift the machine with a crane to remove skids. If no crane is available, **secure against tipping** as soon as the skidded machine is placed on the foundation and before skids are removed. To secure against tipping use a block and tackle. Run one from the housing lifting hole to the rear of the machine and secure to a solid anchor in the building. Run another block and tackle from the other housing lifting hole to the front and secure. To remove skids, raise the machine in about 2" (51mm) steps with the aid of blocking and jacks of sufficient capacity. The jacks should be placed under the front and rear of housings. Use leveling screws in housing feet for inserting and removing jacks. Block up housings, about 2" (51mm) at a time, until there is enough clearance to remove skids. Lower machine by removing the blocking about 2" (51mm) at a time from alternate housings. Temporarily bolt the machine in place on the foundation. Remove the block and tackle used to secure machine against tipping. Remove shipping blocks from between bed and ram.

MACHINES SHIPPED WITH BED REMOVED

! WARNING !

THE MACHINE IS TOP HEAVY TO THE REAR ON SOME MODELS WITH BED ATTACHED ON REAR OF HOUSING. USE EXTREME CAUTION AND ENSURE MACHINE IS SECURED AGAINST TIPPING BEFORE REMOVING SHIPPING SKIDS.

Remove the "X" type shipping braces bolted to the front of housings and thoroughly clean the protective grease from the front faces of the housings. Remove the grease with a clean rag soaked in solvent, such as mineral spirits. Wipe with clean rags. A stiff brush will get into the corners. Do not use an air hose because the pressure could drive grit and dirt into the bearing surfaces.

The front vertical bed mounting faces of the housings must be plumb. This can be checked with the level in squaring head of an ordinary machinist's square or with any level that can be used on a vertical surface. If the housings are not plumb, loosen the nuts on foundation bolts. Use leveling screws in housing feet to raise or lower machine. Do not allow machine to permanently rest on these screws. Insert flat steel shims under the housing feet as required. Lower housings and retighten foundation bolt nuts. Recheck the plumb on housing faces and repeat above procedure if necessary until the housings are plumb.

Remove the bed from rear of housings using a chain or cable of adequate capacity. **DO NOT USE HOUSING SLOT IN THE BED TO LIFT THE BED**. Remove the bed shoes and bed bolts from shipping box. Clean the bearing surfaces of the housings and the matching bed surfaces, and the bed shoes and bolts. Carefully lubricate all finished surfaces of the housings where the bed fits. Also lubricate top and bottom surfaces of bed shoes. Use EP #2 Lithium grease (C.I. grease H-2EP). Place bed shoes into position on the housings. Match the markings on housings and bed shoes. Place the bed into position on housings and insert bed bolts into bed. Loosen all foundation bolt nuts and tighten bed bolts securely. Retighten the foundation bolt nuts securely. See the following chart for bed bolt and foundation nut seating torques.

BOLT DIAMETER	SEATING TORQUES Ft.-Lbs. (Nm)	
	BED BOLT	FOUNDATION NUT
3/4"	297	-
	(403)	-
1"	734	295
	(995)	(400)
1-1/4"	1189	530
	(1612)	(719)
1-1/2"	2033	-
	(2757)	-

Check your work with feeler gages. There should be **no clearance** between the bearing surfaces of the housings and bed. If there is clearance, either the bed bolts are not tight or there is grit between the bearing surfaces. There should also be **no clearance** between the bed shoes and the bed.

The encoder lower mounting brackets were removed for shipment. A CINCINNATI INCORPORATED Service Representative will install and adjust the encoders at start-up.

CLEANING

Thoroughly clean protective grease from all other parts of the machine. Remove the grease with a rag saturated in cleaning solvent (mineral spirits) and wipe with clean rags. A stiff brush will get into the corners. Do not use an air hose. The pressure could drive grit and dirt into bearing surfaces. After cleaning the machine thoroughly,

wipe dry. Make sure no dirt or grit is left, lightly oil the bed and ram finished surfaces. Periodic cleaning of the machine after installation is recommended.

LEVELING

PROFORM Hydraulic Press Brake is leveled by placing flat steel shims (supplied with machine) of proper thickness under the housing feet as required. Use a precision level – not a carpenter's or machinist's level. Always wipe the level and bed surface clean and remove burrs before positioning the level.

The machine can be raised or lowered by using leveling screws in the housing feet. Use at least a two foot length of pipe on the wrench. The foundation bolt nuts must be loosened, **not removed,** before jacking the machine. Before checking the level of the machine, foundation bolt nuts must be securely tightened to the previously specified torque.

Start leveling by checking the setting of machine lengthwise. Place level in the center of bed parallel to edges of the bed. Level the machine lengthwise by placing the required metal shim under the low housing feet, both front and back. Lower the machine and recheck level. Repeat until machine is level lengthwise.

Level the PROFORM Hydraulic Press Brake front-to-back with level crosswise on the bed as shown in Figure 2-2. Check first with the level at the right end of the machine and then at the left end. Add or remove shims under the front or back housing feet as required. Level readings on both ends of bed must be alike within .001" (.025mm). Recheck lengthwise level and repeat above procedure until machine is level in all directions.

FIGURE 2-2 Leveling the machine

Check the ram guide and slide alignment to make sure there is no twist in the machine. This is done by loosening the ram clamp bolts until the ram hangs free of the guides. Measure with a feeler gage the clearance between the ram slide liner and the ram guide at the top and bottom. See Figure 2-3. Measure at both left and right guide. The top measurement is always given a plus (+) value and the bottom is always given a minus (-) value.

EXAMPLE #1:

	Left Clearance	**Right Clearance**
At top	+.005" (.127mm)	+.000"
At bottom	-.020" (.508mm)	-.015" (.381mm)
Then total	-.015" (.381mm)	-.015" (.381mm)

Since the values are equal, the guides are in the same plane and there is no twist in the machine.

EXAMPLE #2:

	Left Clearance	**Right Clearance**
At top	+.005" (.127mm)	+.020" (.508mm)
At bottom	-.015" (.381mm)	-.000"
Then total	-.010" (.254mm)	+.020" (.508mm)

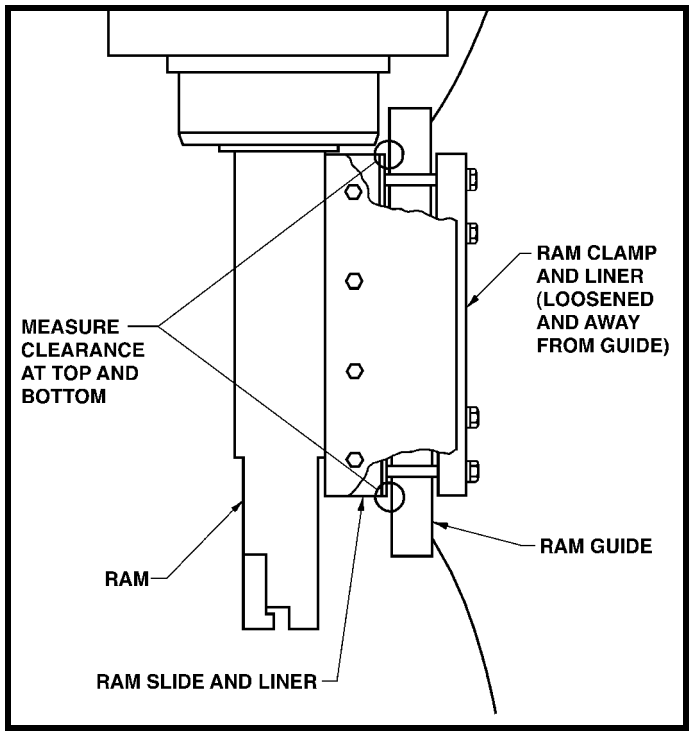


FIGURE 2-3 Ram slide and guide alignment

The amount of clearance is not important. However, the difference between the clearance of the left and right guide/slide indicates the amount of misalignment. The maximum allowable difference is .004" (.102mm). In this example the difference is .030" (.762mm), which indicates there is twist in the machine.

This condition is corrected by adding or removing shims under one of the rear housing feet. In Example #2 the excessive clearance was at the right guide and slide. Since this measurement was positive, the clearance was at the top. To bring the alignment into tolerance, shims could be added under the right rear housing foot, or removed from the left rear housing foot. The alignment must be corrected even if it causes the bed to be out-of-level.

After the machine is level, retighten foundation bolt nuts securely. Recheck guide and slide alignment.

IMPORTANT: Before running the machine, tighten the guide clamp bolts to 60 ft.-lbs. (81.4Nm) and lubricate slide liners with light hydraulic oil. Use tool shown in Figure 2-4 supplied by CINCINNATI INCORPORATED.

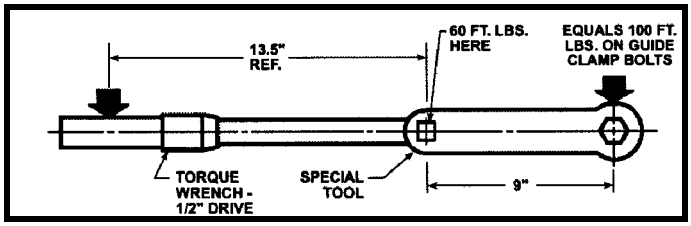


FIGURE 2-4 Tool for guide clamp bolts

IMPORTANT: After loosening and tightening guide clamp bolts for ram guide and slide alignments, the linear transducers should be checked and possibly reset per "Ram Linear Transducer Adjustment" instructions in SECTION 9.

Alignment may not be permanent. Recheck level in a few weeks. Do not use any grouting around the machine. For machines where the bed goes below floor level, leave the bed pit empty and cover exposed pit opening with steel plate.

HYDRAULIC RESERVOIR

The hydraulic reservoir is equipped with a drain valve. See Figure 1-2. Before starting machine, crack this valve open. Water may have collected in the tank during shipment. If no water comes out, or when oil starts coming out, close the valve securely. Repeat this check monthly.

LUBRICATION

Proper lubrication is of extreme importance to your machine. The following lubrication points should be checked before start-up and at regular intervals thereafter.

1. Hydraulic Reservoir: Before starting machine check for proper fluid level at the oil sight gage. The ram must be at full open height to properly check fluid level. See Figure 1-2. Refer to *SECTION 9* for details about proper fluid level.

CAUTION

Standard machines are designed for and shipped with petroleum-based hydraulic fluid, which can be flammable. Check applicable fire codes for special precautions.

2. Cylinder Clevis Pins: Lubricate while cycling ram under load, such as obtained with a bumping die. Lubricate once a month. Use a #2 lithium base grease with "moly" additive (C.I. grease H-2M). This must be done after electrical connections are made and the machine is running.

CAUTION

Keep clear of moving ram.

3. Ram Guides and Slide Liners: Wipe clean and flush with light hydraulic oil.

4. Gages: Clean and lubricate all exposed guide rails with a light coating of spray lubricant or #10 oil. The X and R-Axis ballscrews should also be lubricated with a light coating of spray lubricant or #10 oil. These ballscrews are easily accessed by removing the protective covers. **Do not use grease on the ballscrews.** See *SECTION 9, MAINTENANCE & ADJUSTMENTS* for more specific details.

ELECTRICAL CONNECTION

Suitable electrical leads must be brought to the machine as shown on Foundation Plan drawing. These leads are connected to the incoming side of electrical disconnect switch in the main electrical enclosure. Be certain that leads are the correct size and that proper voltage is fed to the machine. CINCINNATI INCORPORATED equipment requires that the incoming line supply at the machine does not vary more than plus or minus 10% from the nominal. Some installations may require additional line conditioning other than supplied with the machine controls. Contact CINCINNATI INCORPORATED Service Department for further information.

Machine must be connected to a good earth ground. A ground lug on the electrical panel near the disconnect is

provided for this purpose. Refer to local and state codes for acceptable grounding methods.

Note: *If a CINCINNATI INCORPORATED Service Representative is not present,* ***call before proceeding any further or starting machine.*** *Our Service Representative will complete all electrical connections and check motor rotation.*

SECTION 3 SAFETY

SAFETY RECOMMENDATIONS FOR PRESS BRAKE OPERATION

Press brakes manufactured by CINCINNATI INCORPORATED comply with the construction requirements of the Occupational Safety and Health Act and the National Safety Standards of the American National Standards Institute.

The PROFORM is a hydraulic press brake with advanced microprocessor controls and an optional backgage. The press brake is a versatile and multi-purpose machine. We recommend evaluating each press brake operation in order to determine the method of point-of-operation safeguarding which best meets that operation. The press brake, tooling, piece part and method of feed and removal must be evaluated for each job before deciding on the safeguarding to be used. See CINCINNATI Safeguarding Bulletin PI-50686 for ideas on types of safeguarding available.

CINCINNATI INCORPORATED recommends that you read and understand the safeguarding, use and care requirements of the American National Standard for Press Brakes, ANSI B11.3. This is available from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036 and is included with the complete machine manual.

For additional safety information we recommend:

- ♦ securing applicable safety data sheets from the National Safety Council, 1121 Spring Lake Drive, Itasca, Illinois 60143-3201,
- ♦ determining your responsibilities under your state and local safety codes,
- ♦ requesting assistance from the loss prevention department of your workmen's compensation carrier.

Personnel responsible for your press brake operator training program, tooling setup, maintenance, and operations must read and understand this Operation, Safety and Maintenance manual. No one should set up, operate or maintain this press brake until they thoroughly understand it and know how to do their job safely. Read this manual in its entirety.

LOCKOUT / TAGOUT – POTENTIAL HAZARDOUS ENERGY

Lockout / Tagout is a term used to address practices and procedures that are necessary to disable machinery or equipment and to prevent the release of potentially hazardous energy while maintenance and servicing activities are being performed. These practices and procedures usually involve the devices on or near machinery or equipment that is used to turn the machinery completely off or drain down stored energy to a safe level. Some examples are a lockable electrical disconnect, which can shut down all electrical energy to a machine, or a lockable air valve that prevents shop air pressure from reaching the machines' air cylinders. Examples of hazardous energy sources on machinery are rotating flywheels, springs being compressed or stretched, hydraulic pressure (accumulators), air pressure (tanks), and machine rams that are up in their stroke and unblocked.

Your employer will have a Lockout / Tagout Program that you will learn about while being trained to run and work around this and other machines in your shop. In general, Lockout / Tagout requirements do not apply to daily checks during normal production operations (i.e., lubrication, cleaning, minor adjustments or simple tooling changes) as long as measures are taken to provide effective protection to workers.

Reading the ***"OPERATION"*** section of this **OPERATION, SAFETY AND MAINTENANCE** Manual will tell you what devices were furnished with the machine to protect you and your fellow workers from uncontrolled releases of energy. You should also check with your supervisor to learn about any other equipment or machinery placed at or near your machine which you may come in contact with. Make sure you know where these energy sources and protective devices are and how to use them.

Follow the instructions given in this manual closely while installing or removing tooling from this PROFORM Hydraulic Press Brake. Some energy sources cannot be completely shut down when this type of activity is being performed.

FOR SAFE OPERATION OF YOUR CINCINNATI PRESS BRAKE

KEEP CLEAR OF THE POINT-OF-OPERATION

The purpose of a press brake is to bend metal, and it is obvious that this same capacity will sever arms, hands, fingers or any other part of the body that is in the point-of-operation when the ram is activated.

During operation, all parts of your body must be completely clear of the work area. **NEVER PLACE ANY PART OF YOUR BODY IN THE POINT-OF-OPERATION (Die area).**

If operation by more than one person is required, operator controls must be furnished for each person. If foot controls are used, and your evaluation of that specific operation indicates safeguarding is necessary, provide the necessary safeguarding before any work is performed. (See ANSI B11.3 and CINCINNATI Safeguarding Bulletin PI-50686.)

If you use two-hand operator control station(s) as point-of-operation safeguarding, be certain that they comply with ANSI B11.3.

If operation by more than one person is required, one person should be responsible to see that not only his own body is clear of the point-of-operation and all moving parts, but also that his co-workers are clear and entirely visible in a safe location, before the press brake is operated.

During setup, maintenance or other work on the machine which necessitates manipulation within the point-of-operation, either the ram should be at the bottom of the stroke or it should be blocked so the dies cannot close. The power supply should be disconnected and locked-out.

CONCENTRATE ON YOUR JOB

Improper operation of a machine, whether caused by daydreaming or worrying about other problems, could cripple you for life. Operating a press brake requires your complete attention. Talking, joking or participating in or watching horseplay could result in physical injury to you . . . and that is nothing to joke about. So watch what you are doing and concentrate on your job.

NEATNESS IS IMPORTANT

Keep the floor of your work area clear of scrap and trash that could cause you to stumble. Put scrap in the proper containers and keep stock and finished work neatly arranged. Be sure slippery surfaces are cleaned up properly. Stumbling and slipping can result in painful and perhaps even fatal injuries.

Put all tools and equipment away when you are not using them. Only the part you are working with should be on the machine when it is operating. Even a screwdriver can be deadly if left on the press brake or lower die.

PROPER TOOLS ARE IMPORTANT

Use proper tools when working on the press brake. An improper tool might slip and cause lacerations. When making repairs on the machine, disconnect the power source and lock it out. Be sure the ram is at the bottom of the stroke or blocked in place.

ELIMINATE LOOSE AND FLOWING CLOTHING

Loose or flowing clothes may be comfortable, but if they are caught on the machine, it could result in an injury to you. Keep jewelry to a minimum. That link I.D. bracelet you got for Christmas could cost you your hand or finger.

LOOK THINGS OVER CAREFULLY

Before operating your CINCINNATI PROFORM Press Brake, look to see if your machine is in proper condition. Are the dies worn? Are the machine's covers and guards securely in place? Is the machine securely anchored to the floor? Are all nuts, bolts and screws tight? Is everything in proper operating condition? If not, report any unsafe condition or needed repair to your supervisor and be sure the problem is corrected before beginning operations. The CINCINNATI PROFORM Press Brake you are operating will not produce a tonnage much greater than the maximum rated machine capacity (see capacity plate). However, when using short or small area dies, the tonnage must be reduced to avoid damage to the tooling or the bed and ram of the machine. Too much tonnage may also cause a die to rupture and cause injury. Consult the *Press Brake Capacities* bulletin for the load required to do the job. If this is less than maximum machine capacity, program the control not to exceed the required force by more than 10%.

RULES FOR SAFE OPERATION

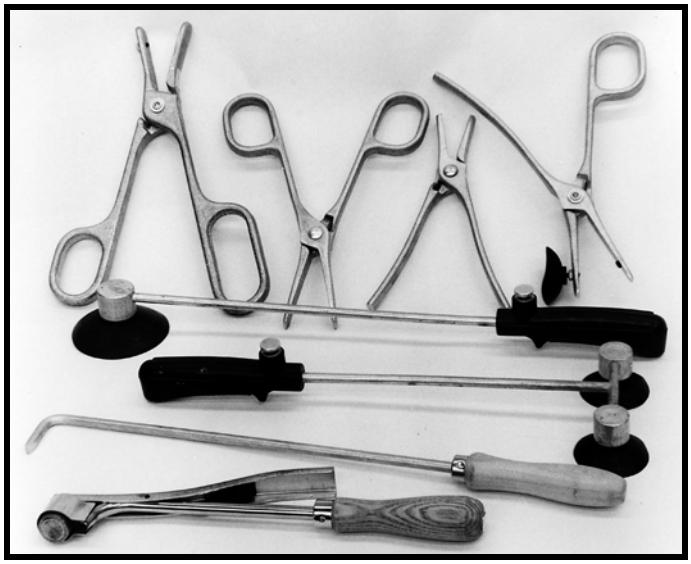
1. **Never place any part of your body in the point-of-operation (Die area).** Placing your hands or any part of your body in the point-of-operation may result in serious injury or amputation.

2. Evaluate each operation to determine the point-of-operation safeguarding to be used.

3. Use the point-of-operation safeguarding selected, or method of operation selected to minimize the

exposure to potential hazards at the point-of-operation.

4. For small part insertion and removal, use a hand tool. **DO NOT** place your hands in the point-of-operation.



5. Know how to safely operate and adjust your CINCINNATI PROFORM Press Brake. Review the Operation and Maintenance sections of this manual.

6. Maintain proper lighting levels and eliminate light glare to prevent eye strain and eye fatigue.

7. Protect your eyes from flying pieces of metal by always wearing your safety glasses.

8. Always wear safety shoes. A heavy or pointed piece of stock could fall and cause serious injury to your foot.

9. Wear snug fitting hand and arm protection when handling rough or sharp edged stock.

10. Keep the die area free of loose tools and materials. When placing stock in the machine for forming, be certain the gages and stops are correctly set and the edge of the stock is against the gages.

11. Stand clear of the workpiece with your arms slightly extended to avoid being hit if the stock whips up or down as the bend is made. Be sure you know how the workpiece will react to the bend being made. If the workpiece whips-up, place your thumbs and fingers below the material. If the workpiece whips down, use the clamp/stop feature of the machine control so your hands can be removed from the workpiece when the bend is made. Set the forming speed to avoid excessive part "whip".

12. When you leave the machine, place the ram at the bottom of the stroke or place safety blocks in position under the ram. Turn OPERATOR CONTROL selector to "OFF" and remove the key, even if you will be away for only a few minutes.

13. Have the routine scheduled maintenance and adjustments performed as shown on the Maintenance Checklist in *SECTION 9*.

14. Check the alignment of the dies before operating the machine after the dies have been changed or if the machine has been idle overnight. Improper alignment could cause chipping and flying chips can cause lacerations and eye injuries.

15. Report any cuts, bruises and all other injuries to your supervisor or the medical department immediately. They are the best judges of the seriousness of your injury.

INSTALLING, REMOVING, AND TRANSFERRING TOOLING (DIES)

Installing, removing and transferring tooling can be hazardous and should be done with proper supervision by experienced setup men. Improper handling techniques can cause muscle strains, hernias or serious disabling injuries.

1. Transfer dies using the proper techniques for the weight of the die(s) being handled:

   a. Very light dies, up to 50 pounds (23kg), can be carried manually or transferred on a die truck.

   b. Dies weighing over 50 pounds (23kg), or those that are awkward to move, should be handled by a hoist.

   If the punch or die has tapped holes for lifting attachments, be sure the proper size bolts are used. A bolt smaller in diameter than the tapped hole will slip out and cause serious injury. If no lifting attachments are provided, use only approved rope slings so the dies will not be nicked or scratched.

   Lift the dies high enough to clear any obstructions, but no higher.

! ! DANGER ! !

STAY CLEAR OF DIES WHILE THEY ARE BEING TRANSFERRED, PARTICULARLY WHEN BEING LIFTED. IF A DIE SHOULD SLIP, SERIOUS INJURY, INCLUDING LOSS OF A HAND, A FOOT OR EVEN YOUR LIFE, COULD RESULT.

2. When installing and setting up dies:

   a. Clean machine and filler block surfaces to which the dies will be fastened. Always turn the machine OFF when working in this area.

   b. Inspect the dies for chips, cracks or other hazardous conditions. Wipe them off with a clean cloth.

   c. Always place the machine control MODE selector in the "SETUP" position so the ram can only be moved by the use of palmbuttons or RAM UP button.

   d. Never reach into or through the die area when aligning the dies or setting the gaging.

3. When removing dies from the press brake:

   a. Clear the work areas of all stock, containers, tools and other equipment.

   b. After placing safety blocks between the dies and turning OFF the machine, clean both upper and lower dies using a bench brush and finally wipe clean with a cloth.

   c. Place machine control MODE selector in the "SETUP" position so the ram can only be moved by use of the palmbuttons or RAM UP button.

   d. Never loosen the ram clamp bolts unless the dies are in a closed position and the OPERATOR CONTROL selector is in the "OFF" position.

Detailed step-by-step instructions for installing and removing tooling are provided in the *SETUP AND USE* section of this manual. These instructions should be followed for safe installation and removal of tooling from your CINCINNATI Press Brake.

Also included in the *SETUP AND USE* section of this manual are instructions for making bends, gaging, blank development and use of the machine controls.

SAFETY SIGNS

In order that press brake operators and maintenance personnel may be warned of certain potential hazards that may exist - unless specified procedures are followed – a number of warning signs are attached to CINCINNATI Hydraulic Press Brakes. Warning signs are not intended to be a substitute for reading and understanding this *SAFETY* section and machine Operation and Maintenance manual.

The warning signs are placed at strategic points on the press brake for the most effective use. It is intended that they become a permanent part of the equipment and, therefore, must not be removed, covered, hidden or defaced. All signs installed on the machine by CINCINNATI INCORPORATED are identified by a small six digit part number in the lower right corner. If any of these plates become damaged or defaced, new ones should be ordered by contacting the factory or the nearest CINCINNATI Sales and Service Office.

The following illustrations are warning signs most commonly used on the hydraulic press brakes. Some other signs may be furnished to cover possible hazards due to special equipment or machine features. The user management should also include additional warning signs to cover any hazards that may be presented by customer-added auxiliary equipment.

HAZARDOUS AREA (232913)

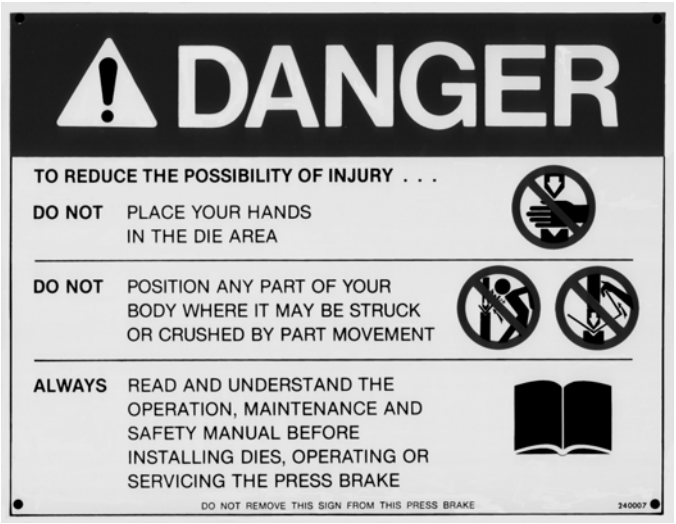
This sign warns of a hazardous area between the machine housings at the rear of the press brake. The sign is attached to a steel restraining cable which spans the space between the housings. No one should enter this area while the machine drive motor is running or the control is energized.

DIE AREA (153725)

This DANGER sign warns the operator to keep his hands out of the die area (point-of-operation). The sign is usually attached to one end of CINCINNATI dies and not on the press brake. These adhesive backed signs have been furnished in safety update packages and are available from CINCINNATI INCORPORATED.

DANGER (240007)

This warning sign is attached to the press brake ram, which is the most visible location on the machine. The sign is a reminder to operators or maintenance personnel that certain procedures must be followed to prevent serious bodily injury.


DANGER
TO REDUCE THE POSSIBILITY OF INJURY . . .
DO NOT PLACE YOUR HANDS IN THE DIE AREA
DO NOT POSITION ANY PART OF YOUR BODY WHERE IT MAY BE STRUCK OR CRUSHED BY PART MOVEMENT
ALWAYS READ AND UNDERSTAND THE OPERATION, MAINTENANCE AND SAFETY MANUAL BEFORE INSTALLING DIES, OPERATING OR SERVICING THE PRESS BRAKE
DO NOT REMOVE THIS SIGN FROM THIS PRESS BRAKE
240007

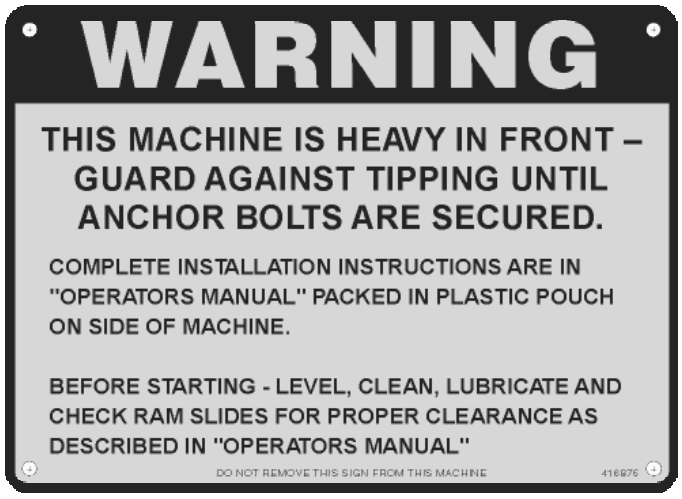
SAFETY GUIDELINES (240003)

This sign is also attached to the ram adjacent to the DANGER sign. It provides a checklist of safety considerations that should be observed before, during and after operation of the press brake.

SAFETY GUIDELINES
HYDRAULIC PRESS BRAKE
READ AND UNDERSTAND THE OPERATION AND SAFETY MANUAL
KNOW HOW TO USE THE OPERATOR CONTROLS AND MODES OF OPERATION
SET UP
POSITION RAM AT BOTTOM OF WORKING STROKE
TURN OPERATOR CONTROLS "OFF" (key lock) WHEN WORKING IN DIE AREA
USE "INCH" MODE AND TWO HAND CONTROL
TO AVOID SPLITTING DIE, MAKE CERTAIN TONNAGE CAPACITY OF DIE IS NOT EXCEEDED
PROVIDE POINT OF OPERATION SAFEGUARDING
TEST ALL THE REQUIRED OPERATION CONTROL STATIONS. MODES OF OPERATION AND SAFEGUARDING
INSTRUCT OPERATORS IN PROPER USE OF SET-UP
REMOVE ALL KEYS UNDER SUPERVISORY CONTROL
OPERATION
USE POINT OF OPERATION SAFEGUARDING
KNOW THE SET-UP AND PROPER METHOD OF OPERATION
TEST ALL THE REQUIRED OPERATOR CONTROL STATIONS AND MODES OF OPERATION . . . BEFORE EACH SHIFT, EACH JOB RUN, AND AFTER EACH BREAK
KEEP HANDS OUT OF DIE AREA (point of operation)
DO NOT POSITION ANY PART OF YOUR BODY WHERE IT MAY BE STRUCK OR CRUSHED BY PART MOVEMENT
USE HAND TOOLS FOR SMALL OR NARROW PIECE PARTS
MAKE CERTAIN EVERYONE IS CLEAR OF PRESS BRAKE, DIES AND MATERIAL BEFORE OPERATING
TURN OFF OR LOCKOUT OPERATOR CONTROLS WHEN NOT OPERATING PRESS BRAKE
WHEN YOU LEAVE THIS PRESS BRAKE:
— POSITION RAM AT BOTTOM OF WORKING STROKE
— TURN OFF OR LOCKOUT OPERATOR CONTROLS
— TURN POWER OFF
DO NOT REMOVE THIS SIGN FROM THIS PRESS BRAKE
240003

GUARD AGAINST TIPPING (416875)

The design of the PROFORM Hydraulic Press Brake is such that much of the weight is concentrated toward the front of the machine. This sign warns that the machine should be guarded against tipping until it is anchored to the floor. The sign refers to the Operator's manual for complete installation instructions.


WARNING
THIS MACHINE IS HEAVY IN FRONT – GUARD AGAINST TIPPING UNTIL ANCHOR BOLTS ARE SECURED.
COMPLETE INSTALLATION INSTRUCTIONS ARE IN "OPERATORS MANUAL" PACKED IN PLASTIC POUCH ON SIDE OF MACHINE.
BEFORE STARTING - LEVEL, CLEAN, LUBRICATE AND CHECK RAM SLIDES FOR PROPER CLEARANCE AS DESCRIBED IN "OPERATORS MANUAL"
DO NOT REMOVE THIS SIGN FROM THIS MACHINE
416875

PRESS BRAKE OPERATOR SAFETY GUIDELINES

- **Be sure you know your press brake - capacity, controls, operating modes, safeguarding**
- **Know and understand the job you are about to perform - material placement, feeding, movement of material being formed**
- **Never place your hands in the die area**
- **Make sure no one is in backgage area at rear of machine**
- **Tooling, press brake and gaging properly set for the job**
- **Always cycle the press brake at least twice without a part in dies before each shift and each job**
- **Keep die area free of all unnecessary material and tools**
- **Do not hang tools on the ram**
- **Adequate safeguarding available and used**
- **Keep your body clear of workpiece**
- **Keep work area clean and orderly**
- **Keep alert - Keep your mind on the job**
- **Hand tools - personal protective devices available and used**

- **Make certain all persons are clear of machine and material before operating**
- **When you leave your press brake:**
  - ◊ **Place ram at bottom of stroke or block**
  - ◊ **Turn OPERATOR CONTROL to "OFF" and remove key**
  - ◊ **Turn MAIN DRIVE to "OFF"**

FAILURE TO FOLLOW SAFE PRESS BRAKE OPERATING PROCEDURES MAY RESULT IN SERIOUS INJURY TO YOU OR ANOTHER EMPLOYEE.

SAFETY MAINTENANCE CHECK

- **SAFEGUARDING at point-of-operation in proper adjustment and operating properly**
- **PINCH POINT guarding properly installed**
- **OPERATOR CONTROLS working O.K.**
- **OPERATING MODES functioning properly**
- **RAM starting and stopping properly**
- **WARNING PLATES clean and easily read**
- **ELECTRICAL WIRING in good condition**
- **CAUTION PAINTING in good condition**
- **AUXILIARY EQUIPMENT checked - working properly**
- **HAND TOOLS and personal protective equipment in good order - readily available**
- **SAFETY MANUALS and OPERATOR MANUALS attached to machine**
- **SCHEDULED NORMAL MAINTENANCE work completed**

SAFETY IS PART OF YOUR JOB... THE MORE ATTENTION YOU PAY TO DEVELOPING SAFE HABITS, THE LESS THE CHANCES OF INJURY TO YOU AND YOUR FELLOW EMPLOYEES.

SECTION 4 SPECIFICATIONS

PERFORMANCE AND RATINGS

SERIES	LENGTH Ft.-Nominal (m)	CLEAR DISTANCE BETWEEN HOUSINGS Ft.-In. (m)	TOTAL OVERALL DIE SURFACE Ft.-In. (m)	SHIPPING WEIGHT (1) PROFORM (NO BACKGAGE) Lbs. (kg)	SHIPPING WEIGHT (1) AUTO CROWN ADDITIONAL WEIGHT Lbs. (kg)	BED PIT REQD.	BED TOP ABOVE FLOOR In. (mm)	BED TOP WIDTH In. (mm)	BENDING CAPACITY (Mild Steel) (2) GA. x FT. (mm x m)	BENDING CAPACITY (Mild Steel) (2) VEE In. (mm)	MOTOR H.P. (kw)
90 PF	6	6'-6-1/2"	8-0"	13,300	1,150	NO	34 (864)	3-1/2 (89)	12 Ga. x 12' (2.7 x 3.7)	7/8 (22)	15 (11.18)
	(1.8)	(2)	(2.4)	(6033)	(522)						
	8	8'-6-1/2"	10'-0"	15,800	2,175						
	(2.4)	(2.6)	(3.0)	(7176)	(987)				10 Ga. x 9' (3.4 x 2.3)	1-1/8 (29)	
	10	10'-6-1/2"	12'-0"	18,300	3,000						
	(3.1)	(3.2)	(3.6)	(8301)	(1361)				1/4 x 5' (6.3 x 1.3)	2 (51)	
	12	12'-6-1/2"	14-'0"	20,800	4,200						
	(3.7)	(3.8)	(4.2)	(9435)	(1905)						
135 PF	6	6'-6-1/4"	8-0"	14,800	1,700	NO	34 (864)	3-1/2 (89)	10 Ga. x 12' (3.4 x 3.7)	1-1/8 (29)	15 (11.18)
	(1.8)	(2)	(2.4)	(6713)	(771)						
	8	8'-6-1/4"	10'-0"	17,000	3,050						
	(2.4)	(2.6)	(3.0)	(7711)	(1348)				3/16 x 10'-3"' (4.8 x 3.1)	1-1/2 (38)	
	10	10'-6-1/4"	12'-0"	19,800	4,475						
	(3.1)	(3.2)	(3.6)	(8981)	(2030)				1/4 x 7'-6" (6.3 x 2)	2 (51)	
	12	12'-6-1/4"	14'-0"	23,800	5,150	YES		4-1/2 (114)			
	(3.7)	(3.8)	(4.2)	(10,795)	(2336)				1/2 x 4'-8" (12.7 x 1.4)	5 (127)	
	14	14'-6-1/4"	16'-0"	29,000	-						
	(4.3)	(4.4)	(4.8)	(13,154)	-						
175 PF	6	6'-6-3/4"	8-0"	18,500	2,250	NO	34 (864)	4-1/2 (114)	3/16 x 13'-4" (4.8 x 4)	1-1/2 (38)	15 (11.18)
	(1.8)	(2)	(2.4)	(8391)	(1021)						
	8	8'-6-3/4"	10'-0"	21,000	4,525						
	(2.4)	(2.6)	(3.0)	(9525)	(2053)				1/4 x 10'-0"' (6.3 x 3.1)	2 (51)	
	10	10'-6-3/4"	12'-0"	24,500	6,550						
	(3.1)	(3.2)	(3.6)	(11,113)	(2971)				3/8 x 6'-3" (9.5 x 2)	3 (76)	
	12	12'-6-3/4"	14'-0"	29,000	7,775	YES					
	(3.7)	(3.8)	(4.2)	(13,154)	(3527)				1/2 x 6'-1" (12.7 x 2)	5 (127)	
	14	14'-6-3/4"	16'-0"	34,000	11,150						
	(4.3)	(4.4)	(4.8)	(15,422)	(5058)						
230 PF	6	6'-6-1/2"	8-0"	22,500	5,000	NO	36 (914)	5-1/2 (140)	1/4 x 12'-9" (6.3 x 3.9)	2 (51)	15 (11.18)
	(1.8)	(2)	(2.4)	(10,206)	(2268)						
	8	8'-6-1/2"	10'-0"	25,300	6,500						
	(2.4)	(2.6)	(3.0)	(11,476)	(2948)						
	10	10'-6-1/2"	12'-0"	29,200	7,625				3/8 x 8'-2" (9.5 x 2.5)	3 (76)	
	(3.1)	(3.2)	(3.6)	(13,245)	(3459)						
	12	12'-6-1/2"	14'-0"	33,500	8,900	YES			1/2 x 8'-0" (12.7 x 2.4)	5 (127)	
	(3.7)	(3.8)	(4.2)	(15,195)	(4037)						
	14	14'-6-1/2"	16'-0"	39,500	11,500						
	(4.3)	(4.4)	(4.8)	(17,917)	(521)						
350 PF	8	8'-6"	10'-0"	34,300	7,525	YES	36 (914)	5-1/2 (140)	3/8 x 12'-5" (9.5 x 3.8)	3 (76)	15 (11.18)
	(2.4)	(2.6)	(3.0)	(15,558)	(3413)						
	10	10'-6"	12'-0"	38,600	9,700						
	(3.1)	(3.2)	(3.6)	(17,509)	(4400)						
	12	12'-6"	14'-0"	44,000	12,400				1/2 x 12'-0" (12.7 x 3.7)	5 (127)	
	(3.7)	(3.8)	(4.2)	(19,958)	(5625)						
	14	14'-6"	16'-0"	50,500	-						
	(4.3)	(4.4)	(4.8)	(22,907)	-						

SPECIFICATIONS

SERIES	MACHINE CAPACITY		(3)		(4)		(5) (6)			OVERALL
	MAX. SPEED AT FULL TONNAGE Inches/Min. (mm/Sec.)	MAX. TONNAGE AT FULL FORM. SPEED Tons (kN)	STD. STROKE LENGTH Inches (mm)	THROAT CLEARANCE FROM CENTER OF DIES Inches (mm)	DIE SPACE Inches (mm)		RAM SPEED Inches/Min. (mm/Sec.)			HEIGHT ABOVE FLOOR Inches (mm)
					OPEN HEIGHT	CLOSED HEIGHT	HIGH APPROACH	VARIABLE FORMING	RETURN	
90	60	67	8	7	15	7	260	1 to 80	280	116.12
	(25)	(596)	(203)	(178)	(381)	(178)	(110)	(1 to 34)	(119)	(2950)
135	41	101	8	7	15	7	200	1 to 55	185	116.75
	(17)	(898)	(203)	(178)	(381)	(178)	(85)	(1 to 23)	(78)	(2956)
175	30	131	10	8	17	7	180	1 to 40	200	123.50
	(13)	(1156)	(254)	(203)	(432)	(178)	(76)	(1 to 17)	(85)	(3137)
230	26	172	10	8	17	7	155	1 to 35	175	126.25
	(11)	(1530)	(254)	(203)	(432)	(178)	(66)	(1 to 15)	(74)	(3207)
350	15	262	10	10	18	8	105	1 to 20	95	133.62
	(6.3)	(2331)	(254)	(254)	(457)	(203)	(44)	(1 to 8.4)	(40)	(3994)

(1) SHIPPING WEIGHTS DO NOT INCLUDE SPECIAL OPTIONS, SUCH AS AUTO CROWN, BACKGAGES, POWER CLAMPS, ETC.

(2) BENDING CAPACITIES ALLOW FOR 15% RESERVE OF RATED TONNAGE TO COVER POSSIBLE INCREASES IN MATERIAL THICKNESS, TENSILE STRENGTH AND YIELD STRENGTH.

(3) STROKE ADJUSTS FROM .50" (13mm) TO ANY LENGTH UP TO MAXIMUM SHOWN.

(4) DIE SPACE IS FOR STANDARD AMERICAN RAM NOSE, AND OPTIONAL WIDE TOPS.

(5) RAM SPEEDS ARE APPROXIMATE (± 15%) AND BASED ON 1800 RPM MOTOR @ 60 Hz.

(6) RAM SPEEDS ARE DETERMINED WHILE RUNNING IN A "NO-LOAD" CONDITION.

PRINCIPLE OF OPERATION

The PROFORM is a hydraulically driven press brake. Linear transducers (potentiometers) constantly monitor the bed-to-ram position. The Control is a self-contained industrial PC with an integrated LCD touchscreen display, floppy disk drive, CD-ROM drive, Operator Control keyswitch and main drive START/STOP buttons. The program controls vertical movement of the ram and horizontal and vertical movements of the optional backgage. After a program is entered, either the machine can be run or the program stored in internal memory. The PROFORM Control allows both individual and long-run jobs consisting of either simple or complex, multi-bend part. After a program is run, the program and related setup information can be saved for future use.

DEFINITION OF TERMS

PUMP: A motor driven, variable volume, hydraulic piston pump provides the flow and pressure for advancing, retracting and loading the power cylinders. This pump is equipped with a "load sensing" control that precisely matches pump flow and pressure to load demands. This precise match provides maximum system efficiency.

LINEAR TRANSDUCERS (POTENTIOMETERS): Each end of the machine is equipped with a high-resolution .0004" (.01016mm) transducer. These transducers continually monitor the ram position at each housing. The transducers are shock-resistant and allow normal punching capacity on these machines.

CONTROL: The machine control provides the high speed processing logic for the ram position, operator programming and optional backgage.

RAM STROKE: Hydraulic pressure from the pump forces the cylinder pistons down or up to move the ram. The stroke length is adjustable. The maximum standard stroke length is shown in the preceding Specifications chart.

TONNAGE CAPACITY: The tonnage on a PROFORM Hydraulic Press Brake is adjustable from approximately 5% of full tonnage to full tonnage. The maximum full tonnage is determined by the cylinders, pistons and the limits of the frame design. The machine capacity plate and the preceding chart show the maximum tonnage capacity. Also, see the CINCINNATI Press Brake Capacities booklet PT-50691 included with the complete machine manual.

DIE SPACE: The PROFORM Hydraulic Press Brake has a fixed amount of die space to accommodate the dies or tooling and filler block. OPEN HEIGHT is the maximum die space available. It is the distance from

the bed top to the ram nose when the ram is at maximum UP stroke position. CLOSED HEIGHT is the minimum die space available. It is the distance from bed top to ram nose when the ram is at bottom of the stroke. See Figure 4-1.

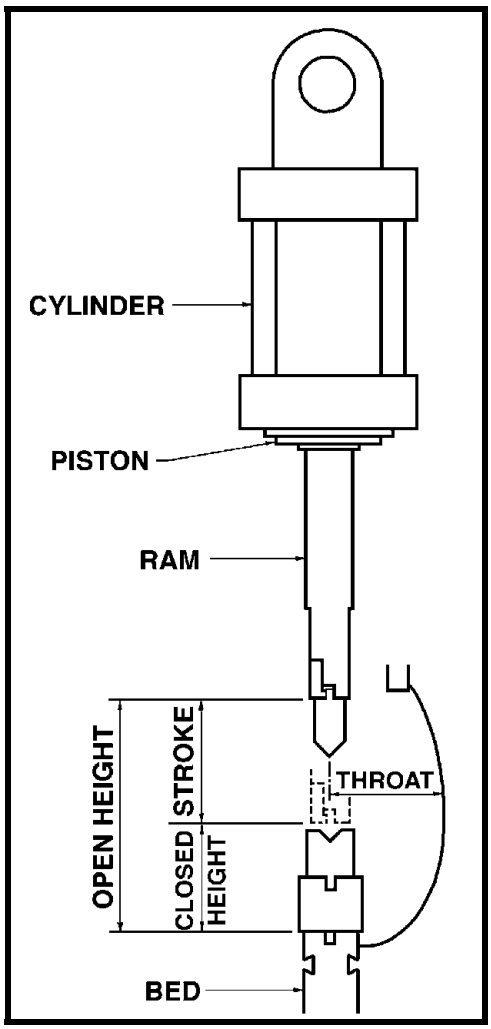


FIGURE 4-1 Die Space

THROAT: Most forming on press brakes is done between the housings. However, when long materials or forming at one end of the machine is required, the housing throat provides space for the material. This space is limited by the depth of throat. Details of the throat are found on the Throat detail drawing.

CLOSED POSITION: This is the overall height of the dies when ram is at the bottom of the stroke and is adjusted to make the proper bend. See Figure 4-2.

DIE PENETRATION: This is the distance the upper die penetrates the lower die. For a 90° air bend die the penetration is about 40% of the vee die opening.

The combined height of the dies and filler block when in the closed position must be more than the closed height but less than the open height dimensions. The difference between this combined height and the open height is the maximum amount of stroke that can be used for a particular setup.

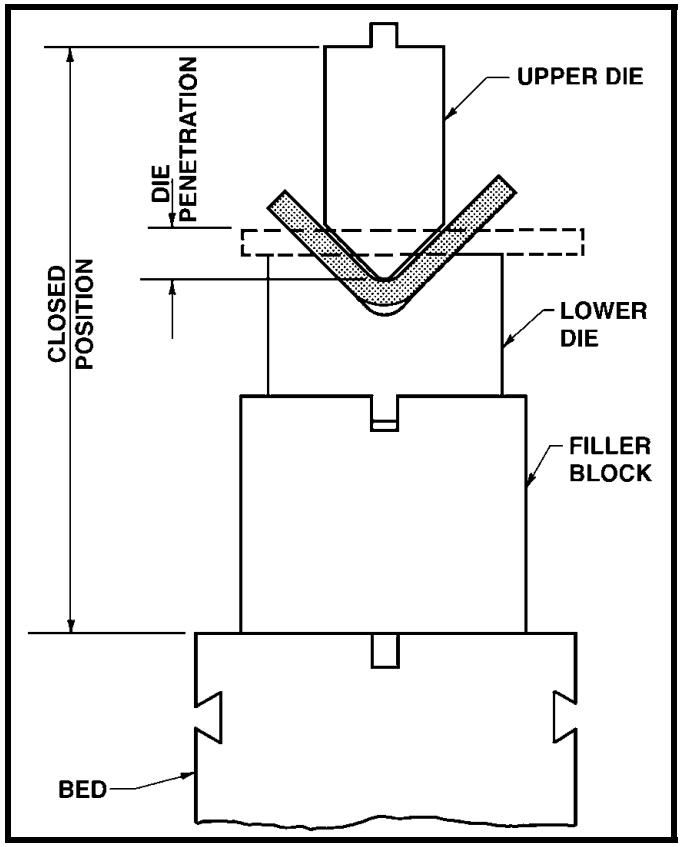


FIGURE 4-2 Closed position

FILLER BLOCKS: Various types of filler blocks are available to hold the lower die. They provide a means of adjusting and clamping the lower die in position. Filler blocks are optional and should be selected to suit the machine tooling and type of bending.

MICROCROWNING: A crown is machined into the bed of each CINCINNATI Press Brake. It is designed so the bed and ram will be parallel at 1/2 to 2/3 of machine capacity with a load uniformly distributed over the nominal length of the machine. This feature improves bend accuracy under normal forming loads and minimizes shimming of the dies. Machines furnished with the optional AUTO CROWN system do not have microcrowned beds.

CAPACITIES

PUNCHING CAPACITY

CINCINNATI Hydraulic Press Brakes are rated to perform punching loads up to 66% of the maximum machine capacity at the center of the machine when punching mild steel using self-contained units on an occasional basis. When punching is to be performed on a

continuous production basis, with dedicated die sets or high tensile - 70,000 PSI (482636 kPa) - material is to be processed, the punching capacity is reduced to 50% of the maximum machine capacity, Figure 4-3. Additional punching capacity can be obtained by stepping the punches (Figure 4-4) on multiple levels. For special punching applications, where die sets or special machine features (for example, wide bed, deep throat, etc.) are required, consult CINCINNATI INCORPORATED.

When punching, the POSITION or Abs. POSITION mode of operation must be used with sufficient tonnage entered to allow punch through.

PRO-FORM SERIES	MAXIMUM PUNCHING CAPACITY TONS/LEVEL (kN/LEVEL)	
	MILD	HI-TENSILE
90PF	60	45
	(534)	(400)
135PF	90	67.5
	(801)	(600.5)
175PF	115	87.5
	(1023)	(778)
230PF	150	115
	(1334.5)	(1023)
350PF	230	175
	(2046)	(1557)

FIGURE 4-3 Maximum punching capacity

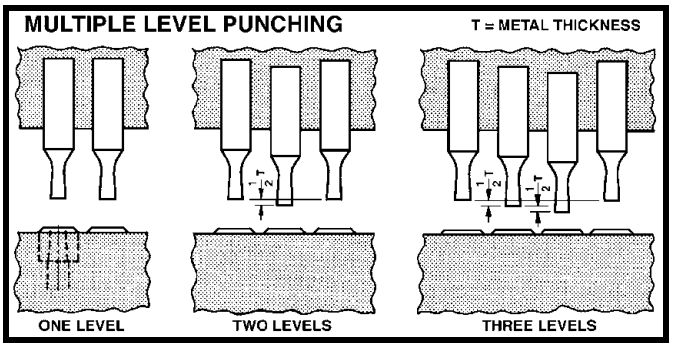


FIGURE 4-4 Multiple level punching

STRIPPING CAPACITY

A stripping load is a force which occurs on the UP stroke of the ram. The direction of this type of load is down on the ram and up on the bed (the reverse of forming and punching loads). Figure 4-5 shows the maximum stripping load available at the center of the machine.

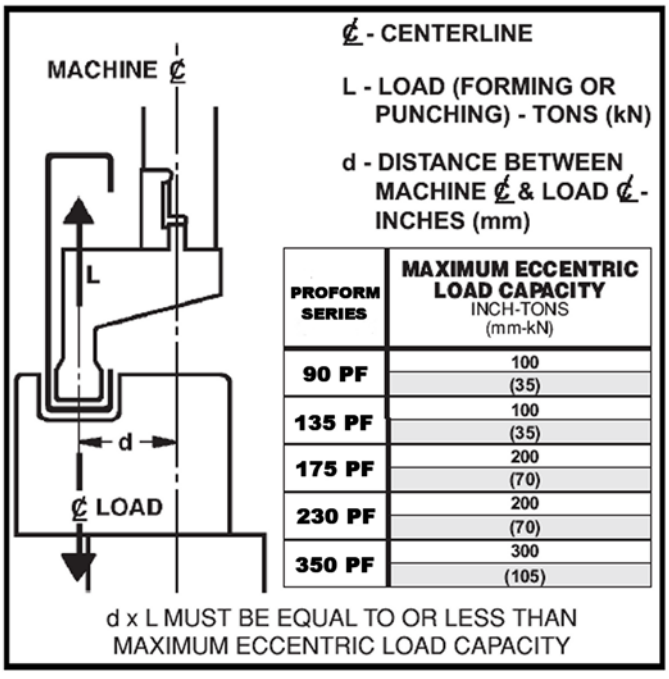
PRO-FORM SERIES	MAXIMUM STRIPPING LOAD TONS (kN)
90PF	9.0
	(80)
135PF	13.5
	(120)
175PF	17.5
	(156)
230PF	23.0
	(205)
350PF	35.0
	(311)

FIGURE 4-6 Stripping load

ECCENTRIC LOAD CAPACITY

(FRONT-TO-BACK)

Occasionally special forming or punching setups are made which do not have their load centers located on the bed and ram centerlines. When this condition exists, care must be taken not to exceed the maximum eccentric (front-to-back) load capacity of the machine. See Figure 4-6.


℄ - CENTERLINE
MACHINE ℄
L - LOAD (FORMING OR PUNCHING) - TONS (kN)
d - DISTANCE BETWEEN MACHINE ℄ & LOAD ℄ - INCHES (mm)
L
d
℄ LOAD
d x L MUST BE EQUAL TO OR LESS THAN MAXIMUM ECCENTRIC LOAD CAPACITY

PROFORM SERIES	MAXIMUM ECCENTRIC LOAD CAPACITY INCH-TONS (mm-kN)
90 PF	100
	(35)
135 PF	100
	(35)
175 PF	200
	(70)
230 PF	200
	(70)
350 PF	300
	(105)

FIGURE 4-6 Eccentric load capacity

! ! DANGER ! !

EXCEEDING THE ECCENTRIC LOAD CAPACITY COULD OVERSTRESS BED, DIE CLAMP AND RAM NOSE ATTACHMENT BOLTS CAUSING THEM TO SHATTER AND POSSIBLY CAUSE SERIOUS INJURY TO PERSONNEL. DAMAGE COULD ALSO OCCURE TO THE SLIDES AND GUIDES AND SINK UPPER BED BOLTS INTO THEIR COUNTERBORES, CAUSING THE BED CONNECTION TO LOOSEN.

OFF-CENTER LOAD CAPACITY

(LEFT-TO-RIGHT)

Most forming and punching jobs are located on the centerline of the machine where full rated machine capacity is available. When the load is not located at the center of the machine, only a portion of the total capacity is available as shown in Figure 4-7.

For example, a 135 PROFORM Hydraulic Press Brake has 100% - 135 tons (1201 kN) of its rating available for bending at the centerline of the machine. At either housing, regardless of length, only 50% of the tonnage – 67.5 tons (600.5 kN) is available.

To determine the available tonnage at a point between the centerline and either housing, the ratios shown in Figure 4-7 can be used. For example, a 135 PROFORM x 10’ Press Brake is approximately 128” (3251 mm) from housing to housing (L). A point at .3 of this length is 38.4” (975 mm) (.3 x 128”/3251 mm). Then at 38.4” (975 mm) from the centerline of the machine 62% (83.7 tons/745 kN) of the tonnage is available.

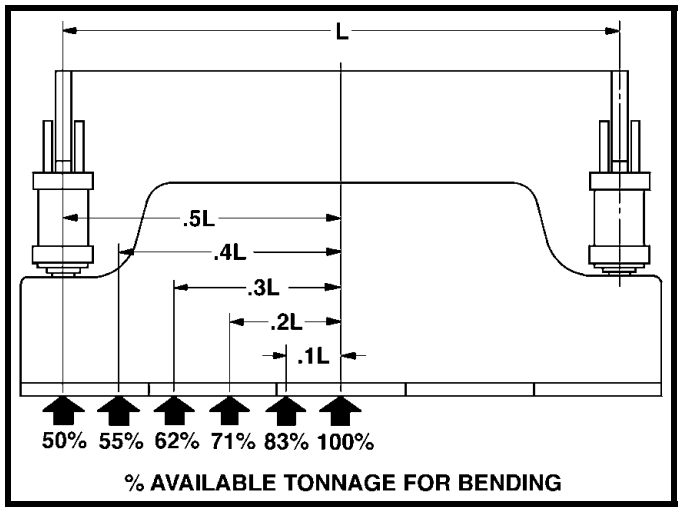


FIGURE 4-7 Off-center load capacity

PRESS BRAKE TOOLING

A hydraulic press brake is a very versatile bending machine. It is capable of exerting high forces between its bed and ram. These forces are applied and directed into the material to be formed by the use of tooling (dies).

The type and shape of the dies are the principle factors in establishing the shape of the part to be formed. There are many different types and shapes of press brake dies. Some have a very special and unique shape. However, most dies are members of a family of tooling called Vee Dies. See Figure 5-1.

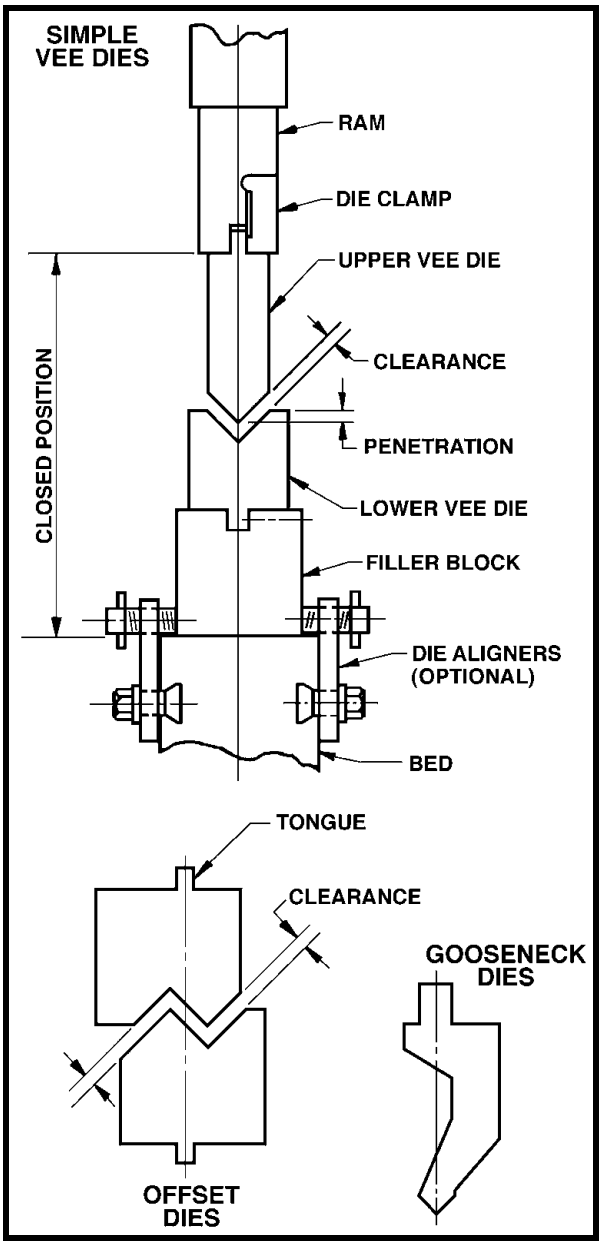


FIGURE 5-1 Vee Dies

These dies, being the most common and widely used, will be referred to in the following instructions.

TYPES OF DIES

AIR BEND DIES: These dies are made with sharper angles than the angle to be formed. The metal being formed contacts only the nose of the upper die and the two radii of the lower vee die opening. See Figure 5-2. Thus, all of the ram force is used in forming and none in squeezing the metal. Any angle greater than the die angle can be formed by adjusting the stroke reversal position as required. See the Press Brake Capacities booklet, PT-50691, included with this manual for further air bending information.

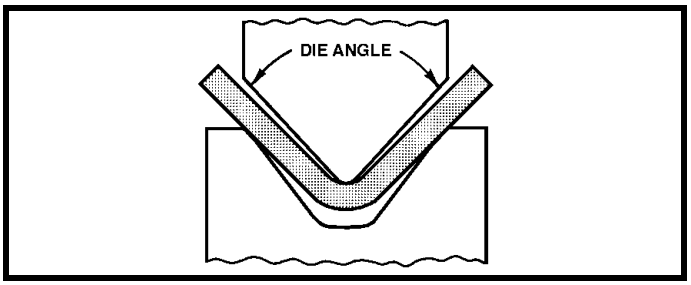


FIGURE 5-2 Air bend dies

BOTTOMING DIES: The primary purpose of bottoming dies is to provide greater part accuracy and special shapes. They can also be used to obtain a relatively sharp inside corner. They are made in matched pairs, according to the thickness of the stock to be formed and radius required. See Figure 5-3. These dies require three to ten times as much force as air bend dies. Other types of bottoming dies are coining dies (used to obtain a sharp inside radius), multiple bend and channel dies, and radius bend dies. Do not use ANGLE mode when bottoming. Use POSITION or TONNAGE Reversal.

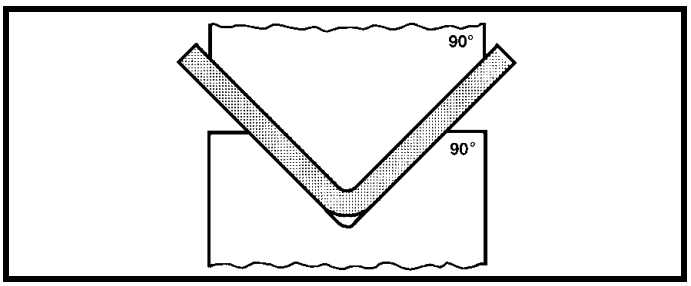


FIGURE 5-3 Bottoming dies

CINCINNATI INCORPORATED can provide many other types of standard and special dies, some of which are shown in Figure 5-4.

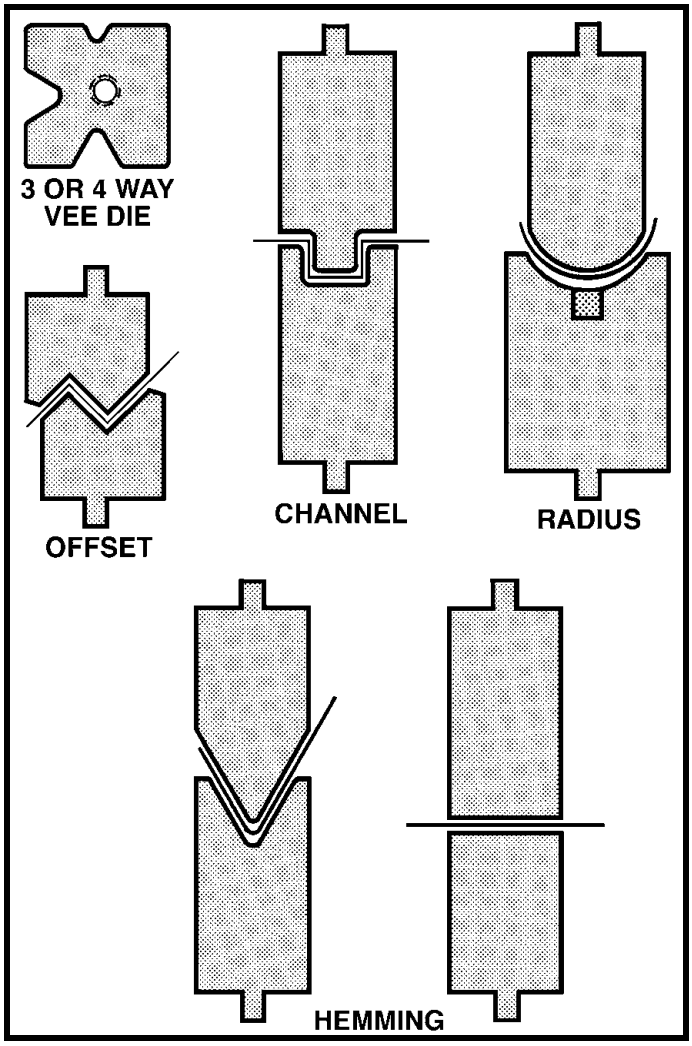


FIGURE 5-4 Types of dies

DIE SETS: Special care and precautions should be taken when operating die sets with guide pins and bushings.

Depending on the working height of the die set, the full stroke return may cause the die set guide pins and bushings to separate. Re-entry of the guide pins into the bushings may be difficult, if not impossible. Each die set application should be reviewed for this condition.

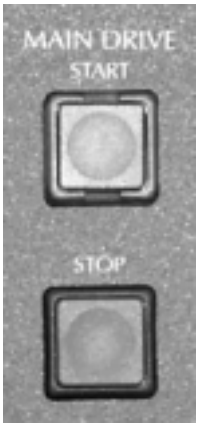
CINCINNATI INCORPORATED recommends that the working height of all die sets be such that the bushings never leave the guide pins when the ram makes a full up stroke.

TOOL INSTALLATION

To install the tooling, use the following procedure:

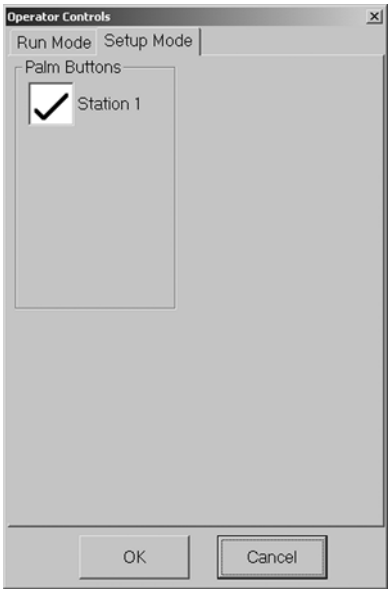
1. If the PROFORM is not already powered-up, turn ON the main disconnect switch on the electrical enclosure.

2. Depress the Main Drive START button on the PROFORM PC Control. Hold the button until the motor starts.



3. Log on to the PROFORM PC Control and verify that the palmbuttons are enabled for SETUP mode. To do this, press the OP STATION button in the toolbar.

Click on the SETUP mode tab of the Operator Stations dialog.



Ensure that the Station 1 checkbox is checked. If it is not already checked, click on the white box to the left of the “Station 1” label to enable it. Then press

the OK button to accept the changes and close the dialog.

CAUTION

Before proceeding, read the guidelines in *SECTION 3 – SAFETY* for installing tooling.

4. Set the STROKE MODE SELECT button to SETUP mode.

In SETUP mode, use the Palmbutton Operator Station to move the ram down and use the RAM UP button to move the ram up.

5. Though SETUP mode is independent of which page is displayed on the PROFORM PC Control, the Job Setup page should be referred to first. Then many users prefer to set the control to the Run/Edit page or to Quick Bend. In addition to displaying the ram position, like the Run/Edit page, Quick Bend also allows quick retracting of the gages if necessary.

   To view other diagnostic information, such as independent left and right ram position or actual gage position, use the Maintenance | Diagnostics | Encoders/Tonnage or Maintenance | Diagnostics | Gage Positions menu items.

6. Turn the CONTROL ON-OFF keyswitch to "ON".

7. Depress the RAM UP button on the Palmbutton Operator Station to raise the ram. The ram will move to the maximum up position and stop. When the ram stops, continue with the next step.

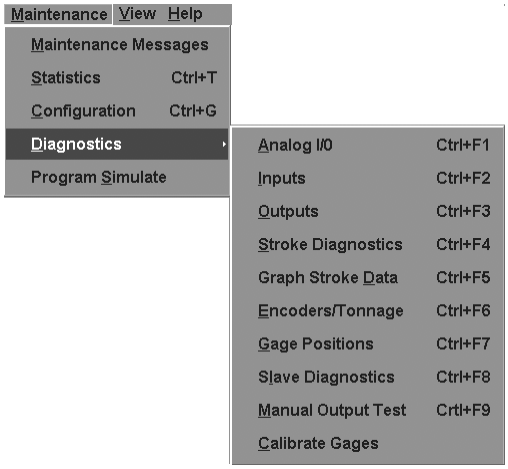
8. Depress the palmbuttons and lower the ram to its maximum down position, and stop.

CAUTION

Make sure the area behind the machine is Clear before calibrating the gage.

9. If the gages are in the way, either use the RETRACT button to the right of the X-Axis label on the Quick Bend page or force a gage calibration using the Maintenance | Diagnostics | Calibrate Gages menu item.

-or-



10. Turn the CONTROL ON-OFF keyswitch to the "OFF" position and remove the key. Then actuating an Operator Station will not cause movement of the ram or backgage.

11. If the filler block has not already been installed, deburr, clean and lightly oil bed top. Place nuts for filler block screws in proper bed cross-slots. Place filler block (die holder) on bed and lightly bolt in place. At this time, also install die aligners (3 front and 3 back) to the front and back of the bed. In some cases, a filler block may not be required and die may be placed directly on the bed. Deburr, clean and lightly oil the top of filler block. Loosen all of the filler block set screws. If machine is equipped with optional Power Clamps, turn LOWER selector switch to "UNCLAMP" position. See Figure 5-5.

    If additional die space is required to install the filler block or lower die, turn the CONTROL ON-OFF keyswitch to "ON", use the RAM UP button to raise the ram so there is just enough space, turn the

CONTROL ON-OFF keyswitch to “OFF” and remove the key.

FIGURE 5-5 CLAMP/UNCLAMP Switch

12. Insert lower die on the filler block. Leave it extended past end of bed several inches. Visually center filler block so lower die is aligned with slot in the ram nose.

13. Loosen all ram die clamps nuts about .125” (3.2mm). If the machine is equipped with optional Power Clamps for the upper die, use CLAMP/UNCLAMP selector switch located on main electrical enclosure (Figure 5-5) to open upper die clamp. Turn the CONTROL ON-OFF keyswitch to “ON”. Depress pushbutton while turning key to the “UNCLAMP” position. A red light will indicate the unclamped position.

14. Move ram as necessary so there is just enough space for the upper die. Use palmbuttons to move ram down or the RAM UP button to move ram up. Turn the CONTROL ON-OFF keyswitch to “OFF” and remove the key.

15. Rest the upper die on extended portion of lower die. Make sure tongue of upper die is in the ram nose slot and that the upper die is trapped by the lower die and ram die slot. See Figure 5-6. Then slide upper die into lengthwise position with the lower die. Slide the set of dies into a centered position on the machine. Tighten the filler block set screws or clamp the lower power die clamp to lock the lower die.

    Note: *Short, lightweight dies may be installed as a set and slid into position.*

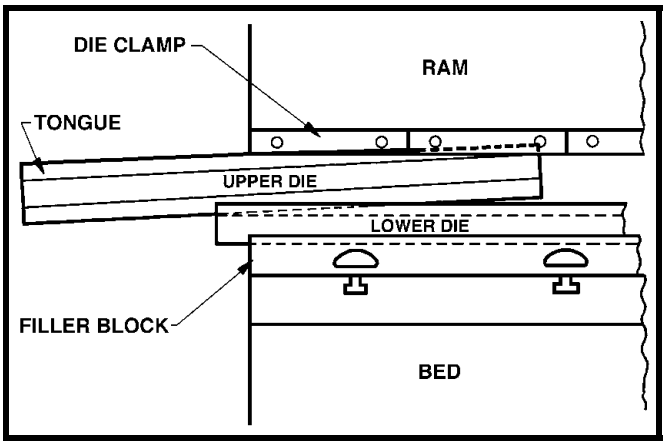


FIGURE 5-6 Die Positioning

16. Moderately tighten ram die clamp nuts or clamp optional upper power clamp to prevent the upper die from falling when the ram is raised. Turn CONTROL ON-OFF keyswitch to “ON”.

17. Use the RAM UP button to raise the ram .125” to .25” (3.2 to 6.4mm). Turn the CONTROL ON-OFF keyswitch to “OFF” and remove key.

18. Visually align the upper and lower dies. Shift the filler block front-to-back using die aligners to obtain rough die alignment.

19. Turn CONTROL ON-OFF keyswitch to “ON”.

20. Inch the ram down using palmbuttons until the upper die is seated. When seating dies, machine tonnage is limited to 10% of the machine’s capacity. For example, for a 350 ton (3114kN) PROFORM the tonnage is limited to 35 tons (311kN).

IMPORTANT: When seating dies it may be advisable to place wood blocks or soft metal between the dies to prevent damage to the dies. Short dies must have sufficient shoulder area to prevent sinking into the ram, bed or filler block.

The hydraulic components and machine frame members are safeguarded against overload by both a pressure transducer and a relief valve in the hydraulic circuit. However, care must be taken to provide enough area under upper and lower dies to prevent them from sinking into the ram nose or bed top due to highly concentrated loads. This is the shaded area shown in Figure 5-7. The minimum area (sq. in.) for each die to prevent sinking may be calculated by this formula:

Die Area = MAXIMUM TONNAGE / 15

An example for a 350 ton (3114kN) machine, the minimum die area for a capacity load is 350

divided by 15, or 23.3 square inches (15032 sq. mm).

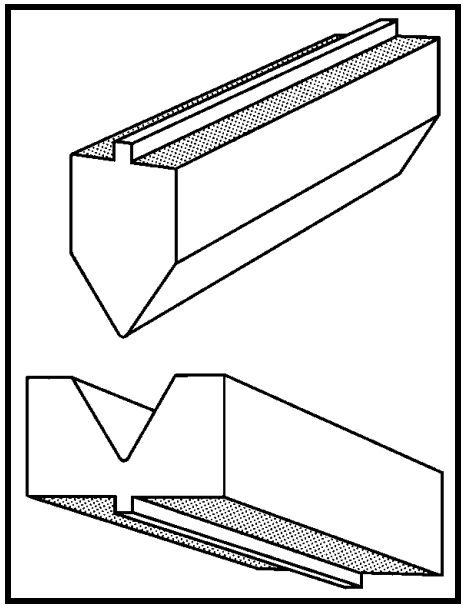


FIGURE 5-7 Seating Dies

21. Turn CONTROL ON-OFF keyswitch to "OFF" and remove key.

22. Fully tighten the die clamp nuts after seating the upper die. Check the shoulders of the die with a .002" (.05mm) feeler gage to make sure it is seated tightly. Turn CONTROL ON-OFF keyswitch to "ON".

23. Run the ram upwards to provide clearance between dies. This clearance should be equal to at least the metal thickness. Turn CONTROL ON-OFF keyswitch to "OFF" and remove key. Check the front-to-back die alignment over the full length of the dies. Realign if necessary by moving the filler block with die aligners. For precision bending requirements, a more accurate alignment is required. Feeler gages should be used to measure front-to-back die clearances between the upper and lower dies at both ends and at the center of the dies.

24. Tighten the filler block to the bed.

GAGING – OPTIONAL BACKGAGE

There are four types of optional backgages available on the 90-350 PROFORM. The CNC Backgage and the CNC Heavy Duty Backgages have a 24" or 40" powered X-Axis (front-to-back) and an 8" manual R-Axis (vertical) adjustment. These backgages have an optional programmable powered R-axis available. The CNC Plate Backgage has a 24", 40", 64" or 80" X-Axis and a 8" or 12" powered R-Axis. The CNC 4X Backgage has a 24" or 40" powered X-Axis and 8" or 12" powered R-Axis. It also has a powered Z-Axis (right to left).

CAPACITY

The CNC Backgage is designed for sheets, 3/16" (4.8mm) maximum thickness, that weigh less than 100 lbs. (45 kg). The CNC Heavy Duty Backgage and CNC 4X Backgage are designed for sheets 1/4" (6.4mm) maximum thickness that weigh less than 150 lbs. (68 Kg). The CNC Plate Backgage is used for gaging large plates or sheets weighing over 500 lbs. (227Kg). Reasonable care should be used when positioning heavy sheets against these gages.

IMPORTANT: Heavy shock loads could damage parts of the gage.

The standard horizontal (front-to-back) travel is 24" (610mm). It is power driven at 1200 in/min. for the CNC, Heavy Duty, and 4X Backgages and 400 in/min. for the CNC Plate Backgage. The gage is positioned and sequenced by the program entry in the PROFORM control. The gage fingers are manually positioned along the length of the gage bar using a gage positioning tool or programmed on the 4X backgage.

GAGE ASSEMBLY

Two gage assemblies are furnished with each backgage and are mounted on the backgage gage bar. The gage assemblies (Figure 5-8) are manually positioned along the length of the gage bar, usually centered on the tooling and spaced apart a distance less than the length of the workpiece.

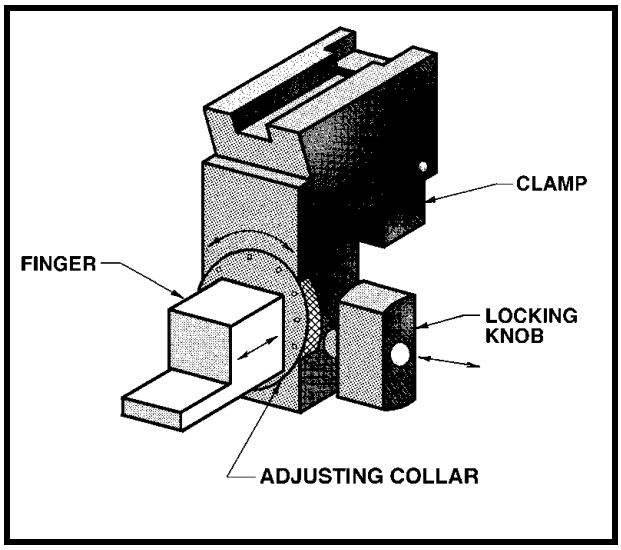


FIGURE 5-8 Gage assembly

Two pairs of gage fingers are furnished with each backgage. The 1" (25mm) gage finger or the 1/4" (6.4mm) gage finger is installed into the gage assembly

as shown in Figure 5-9. The 1” (25mm) gage finger should be used wherever possible, as it provides the largest target and contact area. The 1/4” (6.4mm) gage finger can be rotated in the gage assembly to provide either a 1” (25mm) or a 1/4” (6.4mm) high surface for short flanges. An optional 1/8” (3.2mm) gage finger can be furnished for smaller flanges. 1”, 1/4”, and 1/8” optional flip fingers are also available.

The face of the gage fingers is the contact surface and gaging surface for the workpiece when it is pushed through the dies for gaging. The distance from the face of the gage finger to the centerline of the dies is the gage distance.

IMPORTANT: Do not gage from the front surface of the aluminum gage bar due to wear and possible damage of this surface.

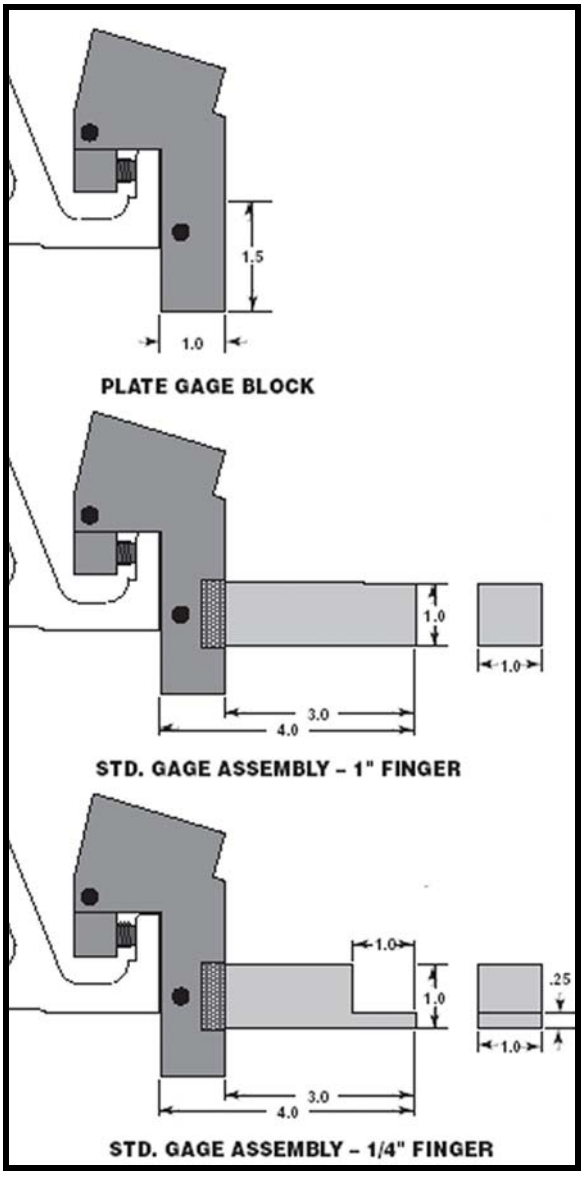


FIGURE 5-9 Standard gaging surfaces

It is generally recommended that two-point gaging be used. This minimizes sheet edge camber effect and allows greater flexibility in positioning gage contact points. See Figure 5-10.

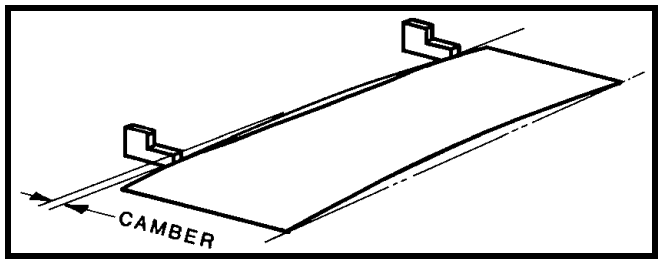
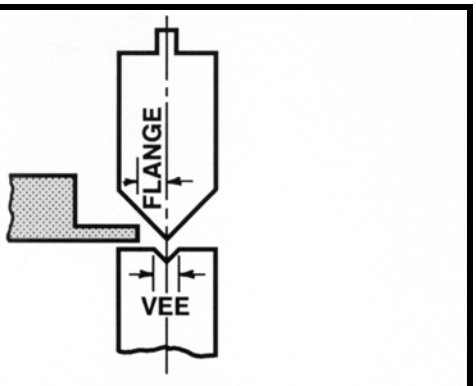


FIGURE 5-10 Two-point gaging

To select the gage finger for the forming job to be run, refer to Figure 5-11. This chart provides the minimum flange size it is possible to form with a given size vee die.

IMPORTANT: The selected gage surface should be analyzed carefully to avoid interference with the tooling and yet provide a large enough target to ensure part contact.



VEE Inch (mm)	FINGER SIZE 1" (25.4mm)	.25" (6.4mm)	.125" (3.2mm)
.25	1.125	.438	.313
(6.4)	(28.6)	(11.1)	(8)
.375	1.188	.5	.375
(9.5)	(30.2)	(12.7)	(9.5)
.5	1.25	.563	.438
(12.7)	(31.8)	(14.3)	(11.1)
.625	1.313	.625	.5
(15.9)	(33.3)	(15.9)	(12.7)
.75	1.375	.688	.563
(19)	(35)	(17.5)	(14.3)
.875	1.438	.75	.625
(22.2)	(36.5)	(19)	(15.9)
1"	1.5	.813	.688
(25.4)	(38.1)	(20.6)	(17.5)
1.125	1.563	.875	.75
(28.6)	(39.7)	(22.2)	(19)

FIGURE 5-11 Minimum flange size

ADJUST GAGE FINGER POSITION

Vertical position of the gage surfaces with manual "R" are adjusted by loosening the screw clamp, turning the hand crank on the gage carriage (Figure 5-12), and tightening the screw clamp.

Vertical position of the gage surfaces with power "R" axis is adjusted with the program or they can be adjusted with the gage jog softkeys. The best height for the gages will depend upon the shape of the part being formed. Standard adjustment limits are shown in Figure 5-13.

CAUTION

If the gage bar of fingers are to be positioned over the top of the lower die, care should be taken to make this height adjustment before moving the gage forward. This will avoid a collision between the gage and the tooling.

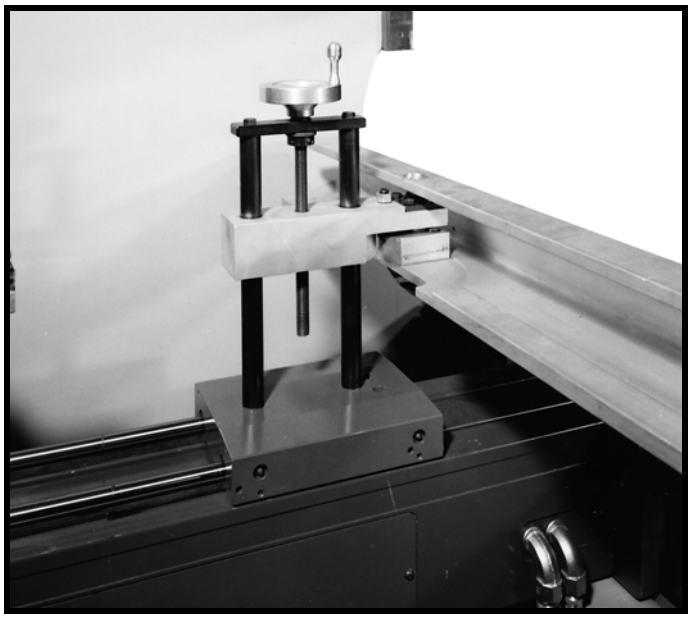


FIGURE 5-12 Adjusting vertical gage position

The gage finger assemblies should be positioned left-to-right to contact the part being formed at the desired gage points. Normally the two gage finger assemblies should be spread as wide as possible to provide the most accurate gaging. The gage finger assemblies are moved along the gage bar by using the gage positioning tool (Figure 5-14). This tool releases the gage assembly clamp and holds the assembly while it is being moved. The gage positioning tool is used to position the gage assemblies from the front of the machine. The gage finger assemblies are installed or remounted by using the gage positioning tool.

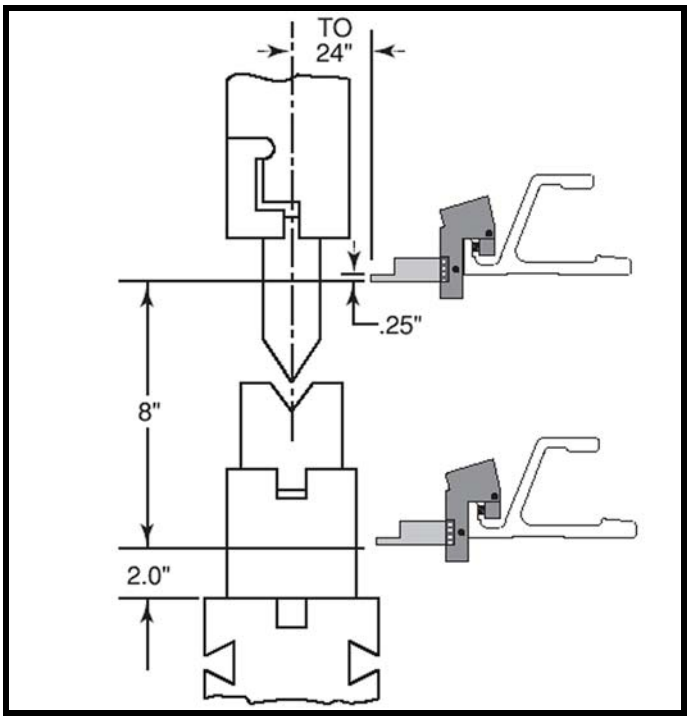


FIGURE 5-13 Adjusting gage surfaces

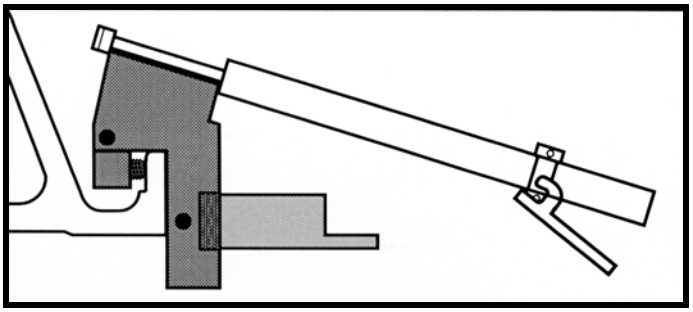


FIGURE 5-14 Gage positioning tool

! WARNING !

THE FOLLOWING GAGE FINGER ADJUSTMENTS SHOULD NEVER BE MADE WHILE THE GAGE ASSEMBLY IS IN PLACE ON THE BACKGAGE. ALWAYS USE THE GAGE POSITIONING TOOL TO REMOVE THE GAGE ASSEMBLY.

Minor part flange differences (end-to-end) can be corrected by adjusting the individual gage fingers either forward (to shorten flange) or backward (to lengthen flange). First remove the gage assembly from the backgage bar. Loosen the finger by pulling out the locking knob (Figure 5-8) and turning knob counterclockwise. The adjusting collar has a total range of .060" (1.5mm) adjustment.

Adjust the collar either forward or backwards the desired amount. Reseat finger shoulder tightly against adjusting collar and tighten the locking knob. All gages are

shipped from the factory zeroed from the centerline of the ram with the gage assembly at .00" position.

Note: *The locking screw knob spins freely unless it is pulled out. This allows the knob to rest against the backgage face, thus preventing the finger from being unlocked while the assembly is in position on the gage bar.*

PROGRAM GAGE POSITIONS

Now that the gage assemblies and the gage fingers have been positioned left-to-right and vertically, the backgage can be programmed for its front-to-back positions.

The actual position of the gage in relation to the tooling is selected when entering a program into the Control. This procedure is described under in *SECTION 7,* "GAGE PAGE". The actual gage dimension from the centerline of the tooling to the gage surface is determined by two program inputs, flange dimension and gage allowance. The actual gage dimension input is the sum of gage allowance and flange dimension. See Figure 5-15.

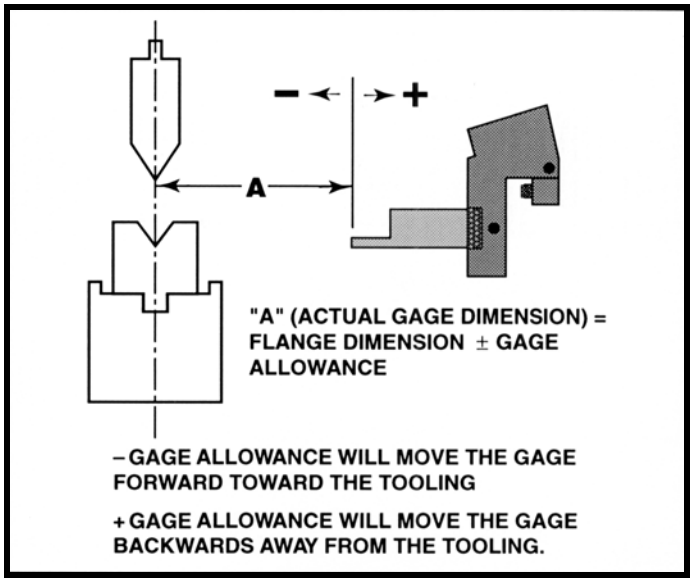

A
"A" (ACTUAL GAGE DIMENSION) = FLANGE DIMENSION ± GAGE ALLOWANCE
– GAGE ALLOWANCE WILL MOVE THE GAGE FORWARD TOWARD THE TOOLING
+ GAGE ALLOWANCE WILL MOVE THE GAGE BACKWARDS AWAY FROM THE TOOLING.

FIGURE 5-15 Figuring actual gage dimension

Normally the control will position the gage bar relative to the ram centerline for a gage surface that is 4.000" (102mm) in front of the face of the gage bar. This is correct when using standard gage finger assemblies with 3.000" (76mm) long fingers, along with tooling that is centered on ram centerline. Shorter gage assemblies require negative offset and longer assemblies require positive offset values. *(**Note:** Put this offset in the finger offset field on the Gage Page.)*

The 1/4" (6.4mm) gage finger can also be used as a sheet support as shown in Figure 5-16, for lightweight sheets.

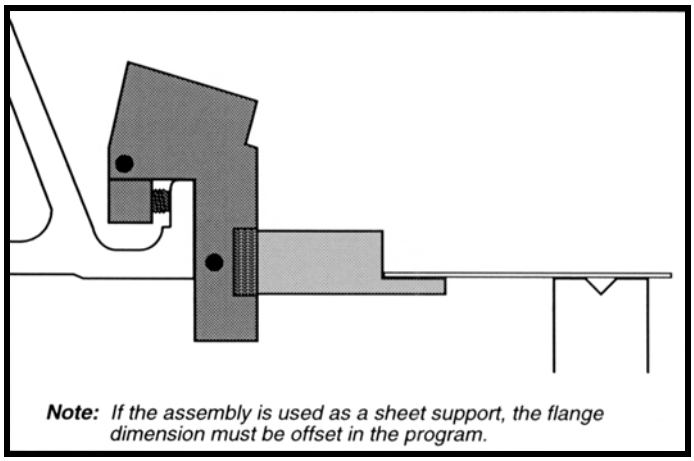


FIGURE 5-16 Gage finger used as sheet support

WORK SUPPORTS

Work supports for light gauge material are available as optional equipment. They are intended to be used in the rear of the bed when long backpieces (which droop away from the gage surface) are formed. These supports attach to rear dovetail slots in the bed and should be positioned at same height as the top of lower die. Figure 5-17 shows a typical work support setup. Make sure backgage bar and gage finger assemblies clear the work supports.

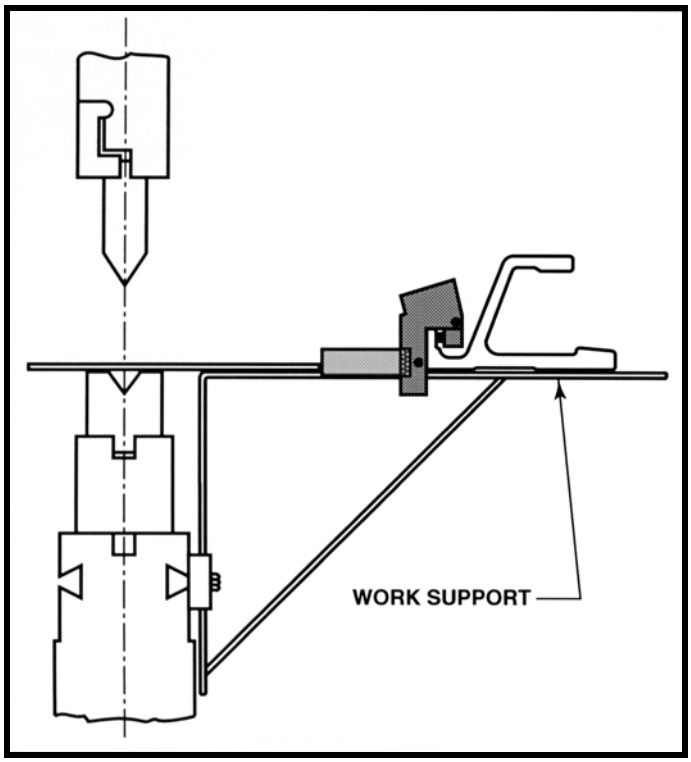


FIGURE 5-17 Typical work support setup

OPERATING TECHNIQUES

The following guidelines will help the operator avoid operating problems, producing bad parts, causing injury to himself or damage to the tooling or machine.

TOOLING AND SETUP

- **DO** inspect the tooling carefully before starting any job. It may be impossible to compensate for badly worn dies and they could create a safety hazard.
- **DO** select tooling which is correct for the job and compatible with machine capacity. It is especially important to have the exact tooling when recalling a previously run program from storage.
- **DO** ensure that tooling shoulders are tightly seated against ram and filler block, and that upper and lower dies are aligned front-to-back.
- **DO NOT** attempt to air bend a part to the same angle as the die. Dies must have sufficient allowance for springback so the part does not bottom in the dies. It may be necessary to use 75° (or less) dies when 90° air bending for certain materials with large "springback". See Figure 5-18.

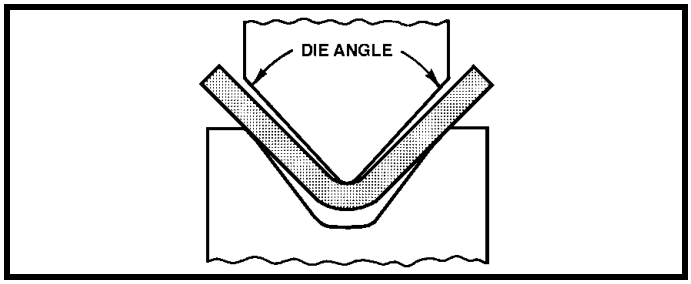


FIGURE 5-18 Air bend

- **DO NOT** attempt to air bend a part using TONNAGE REVERSAL mode (refer to *SECTION 7)*. Bottoming dies must be used when reversing on tonnage. See Figure 5-19.

  Note: *Either air bend or bottoming dies can be used when using REVERSAL POSITION mode (refer to SECTION 7). However, sufficient clearance in the dies is necessary to avoid excessive tonnage build-up.*

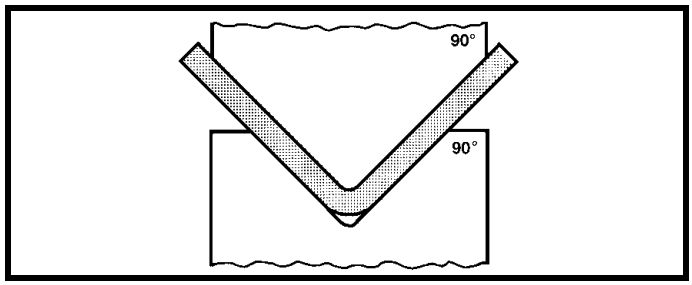


FIGURE 5-19 Bottoming

- **DO NOT** use TONNAGE reversal when punching. POSITION or Abs. POSITION reversal should be used for punching.
- **DO** use as large a vee die opening as possible when air bending. Larger vee openings are less sensitive to material thickness variations, deflections and tooling height variations.
- **DO** make ram tilt and die shimming adjustments as soon as possible when setting up a program as they may affect program inputs.

RUNNING

- **DO NOT** start running a job until the proper methods and safeguards to protect the operator and others from injury are understood and are in place.
- **DO NOT** jog through the bend.
- **DO** remove burrs or keep burrs up on material for more consistent bends.
- **DO NOT** make angle corrections in the middle of a production run unless two or more consecutive bends are out-of-tolerance.
- **DO** store the changes that are made to a new or old program. The latest program must be stored to save the changes.
- **ALWAYS** block the ram or position the ram at bottom of the stroke and turn "OFF" OPERATOR CONTROLS switch and remove the key whenever leaving the machine.

SPEED CHANGE/FORMING SPEED

- **DO** ensure that the forming speed selected is appropriate for the part being formed. Too high a speed may cause "whip-up", which could be hazardous to the operator or cause part damage.
- **DO** ensure that the speed change position is compatible with the forming speed selected. If a high forming speed is programmed and the speed change point is close to the material (less than

.25”/6.35mm), then inconsistent part forming motion and bend angle may occur.

IMPORTANT: When using Hand / Foot Sequence, the speed change point should be no higher than 0.25” above the material.

When using high forming speeds and short approach strokes, it is advisable to eliminate speed change by raising the speed change point above the top stop. In many instances, this will provide more strokes per minute and smoother motion.

GAGES

- **DO** ensure that gaging surfaces will not interfere with the tooling or ram when setting up or running a job.
- **DO** use the gaging surface that provides the largest possible gaging target.
- **DO** spread gage fingers as far as possible to achieve the best gaging accuracy.
- **DO** support workpiece in the gaging position, both in front and rear of the bed.

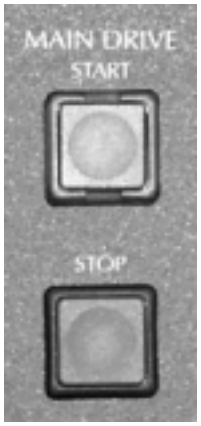
REMOVING TOOLING

To remove the tooling:

CAUTION

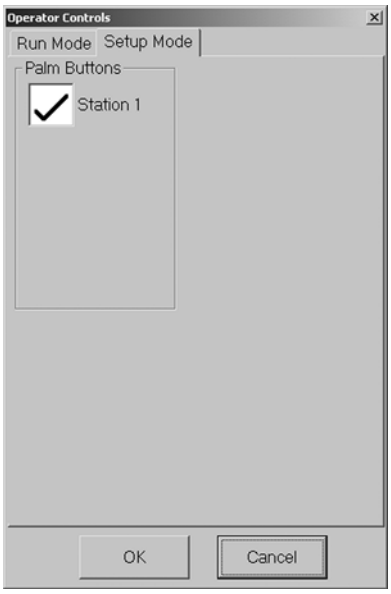
See *SECTION 3 – SAFETY* for proper removal of dies.

1. If the PROFORM is not already powered-up, turn ON the main disconnect switch.
2. Depress the Main Drive START button on the PROFORM PC Control. Hold the button until the motor starts.



3. Log on to the PROFORM PC Control and verify that the palmbuttons are enabled for SETUP mode. To do this, press the OP STATION button in the toolbar.

Click on the SETUP mode tab of the Operator Stations dialog.



Ensure that the Station 1 checkbox is checked. If it is not already checked, click on the white box to the left of the 'Station 1' label to enable it. Then press the OK button to accept the changes and close the dialog.

4. Set the STROKE MODE SELECT button to SETUP mode.

In SETUP mode, use the Palmbutton Operator Station to move the ram down and use the RAM UP button to move the ram up.

5. Turn the CONTROL ON-OFF keyswitch to “ON”.

6. Depress the palmbuttons and lower the ram to a position where there is .06" to .12" (1.5mm to 3.1mm) clearance between the upper and lower dies.

7. Loosen the ram die clamp nuts or unclamp the upper power clamps to release the upper die. Loosen the filler block set screws or unclamp the lower power clamp to release the lower die.

8. Turn the CONTROL ON-OFF keyswitch to the "OFF" position and remove the key.

IMPORTANT: When loosening the clamps for upper die, be sure upper die will remain trapped between the lower die and the slot in ram nose. See Figure 5-20.

9. The dies can now be removed from the end of the machine. They may be removed either together or individually, depending on their size and weight. Use proper material handling equipment and methods.

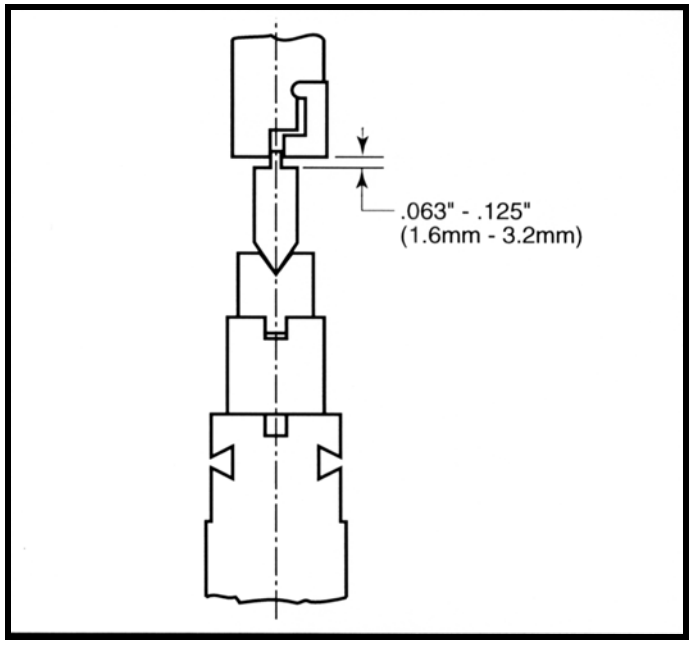


FIGURE 5-20 Removing tooling

PC CONTROL

The PROFORM PC Control is an industrial PC control with an integrated LCD touchscreen display, floppy disk drive, CD-ROM drive, CONTROL ON-OFF keyswitch and MAIN DRIVE START / STOP buttons.

FIGURE 6-1 Pendant

LCD TOUCHSCREEN DISPLAY

The LCD Touchscreen display is the main user interface point of the PROFORM PC Control. Information is displayed on the flat LCD and user interaction is primarily accomplished with the touchscreen that is integrated with the LCD. Special controls have been added to the software to make user input quick and intuitive with the touchscreen.

FLOPPY DISK DRIVE

FIGURE 6-2 Floppy disk & CD-ROM drives

The PROFORM PC Control contains one 3.5" floppy disk drive. This floppy drive can be accessed by opening the cover that protects the floppy drive and CD-ROM drive.

Files can be copied to or from the floppy drive using the Windows operating system using Windows Explorer or the "My Computer" icon.

IMPORTANT: The cover over the floppy disk and CD-ROM drive is provided to prevent contamination and should be kept closed except for changing floppy disks or CDs. Failure to keep the cover closed could result in damage to the drive assembly and/or loss of data.

! WARNING !

NEVER REMOVE A DISK FROM THE DRIVE WHILE THE DISK ASSESS LIGHT IS "ON". THIS WILL RESULT IN LOSS OF DATA ON THE DISK. ALWAYS MAINTAIN PROPER BACKUP COPIES OF IMPORTANT DATA.

CD-ROM DRIVE

A CD-ROM drive is included for easy updating of software. The CD-ROM drive can be accessed by opening the cover that protects the floppy drive and CD-ROM drive.

To insert or eject a CD-ROM, press the button on the lower right-hand corner of the drive. The CD drawer will slide out, allowing the removal of the CD inside or the insertion of a different CD.

SWITCHES AND BUTTONS

The CONTROL ON-OFF keyswitch and the MAIN DRIVE START / STOP pushbuttons are located on the left side of the PROFORM PC Control Pendant.

FIGURE 6-3 Switches and Buttons

CONTROL ON-OFF KEYSWITCH

This keylock switch must be turned ON to allow the active Operator Stations to cycle the ram.

In the "OFF" position, the Operator Stations are prevented from cycling the ram even though the main

drive motors may be running. The ram cannot be moved with the RAM UP button on the Palmbutton Operator Station.

! WARNING !

THE OPERATOR SHOULD LOCK THIS SWITCH OFF AND REMOVE THE KEY WHEN AWAY FROM THE MACHINE OR WHEN PERFORMING ADJUSTMENTS TO PREVENT ANYONE FROM CYCLING THE MACHINE.

MAIN DRIVE START AND STOP PUSHBUTTONS

To start the main drive motor, the START pushbutton is held depressed. If the internal check indicates all components are operating properly, the motor will start. The START pushbutton will illuminate to indicate the drive motor is running.

When the STOP pushbutton is depressed, all power to main drive motor and valves is turned off. The main drive motor and hydraulic pumps will stop.

Note: *If a machine fault should occur during operation, it is recommended that power is turned off by pressing the EMERGENCY STOP button on the Operator Station or the Main Drive Stop Button on the Pendant.*

OPERATOR STATIONS

The standard Operator Station (Figure 6-4) is a dual palmbutton station located on the front of the ram. In addition to this ram-mounted Palmbutton Operator Station, other Operator Stations may include pedestal-mounted Palmbutton Operator Stations, and Footswitch.

PALMBUTTON STATION

PALMBUTTON SWITCHES

Two guarded palmbutton switches are located on either end of the Palmbutton Operator Station (ram-mounted or pedestal-mounted). As a safety feature, they must be pressed at about the same time to start ram motion. The palmbutton switches will cycle the ram in all modes of operation except “FOOTSWITCH ONLY”. Releasing either palmbutton switch will stop the ram. Both palmbutton switches must be released and then depressed again to start ram motion.

Note: *The above description refers to the individual palmbutton switches on a single Palmbutton Operator Station.*

PALMBUTTON OPERATOR STATION LIGHTS

When the Palmbutton Operator Station is made active from the PROFORM PC Control, the amber “ON”" light is illuminated. The ram can then be cycled with the palmbutton switches. When the Palmbutton Operator Station is turned “OFF” on the PROFORM PC Control, the red OFF light on the Palmbutton Operator Station is illuminated and the ram cannot be cycled with the palmbutton switches.

Note: *One light should always be lit when the machine is powered. If neither or both lights are lit, the Palmbutton Operator Station should be checked by a qualified electrician.*

RAM UP BUTTON

Depressing this pushbutton will cause the ram to go up, regardless of the motion or position of the ram. As long as the button is depressed, the ram will go up until it reaches full top of stroke position. The ram will stop if the RAM UP button is released. The active Operator Station must be released and depressed again to resume ram motion.

EMERGENCY STOP (E-STOP) BUTTON

When this red button is pressed, power is removed from the main drive motor and gages. The ram will stop on either the down or up stroke.

NEXT RAM MOVEMENT LIGHTS

These lights indicate the direction of movement that the ram is moving, or will move when an active Operator Station is depressed. Red indicates down movement and green indicates up movement, except in the case of the RAM UP button, which overrides these lights.

RAM-MOUNTED PALMBUTTON OPERATOR STATION

The palmbutton switches will actuate ram movement. The RAM UP button will move the ram up on either the down or up stroke. Lights are provided to indicate the direction of the next ram movement (except in the case of the RAM UP button).

FIGURE 6-4 Ram-mounted Palmbutton Operator Station

PEDESTAL-MOUNTED PALMBUTTON OPERATOR STATION

The pedestal-mounted Palmbutton Operator Station has palmbutton switches, RAM UP button and ram direction lights.

The palmbutton switches will actuate ram movement. The RAM UP button will move the ram up on the down or up stroke. Lights are provided to indicate the direction of the next ram movement (except RAM UP button).

FIGURE 6-5 Pedestal-mounted Palmbutton Operator Station

FOOTSWITCH

A cable-connected Footswitch is provided to actuate ram movement. This is a guarded, three-position Operator Station which controls ram motion. A handle is included for ease of positioning.

When the Footswitch is made active on the PROFORM PC Control, an amber light on the Footswitch will indicate that it is turned ON and the ram can be cycled with the Footswitch.

If the Footswitch is not active on the PROFORM PC Control, a red light on the Footswitch will indicate that it is turned OFF and the ram cannot be cycled with the Footswitch.

Note: *One light should always be lit when the machine is powered. If neither or both lights are lit, the Footswitch should be checked by a qualified electrician.*

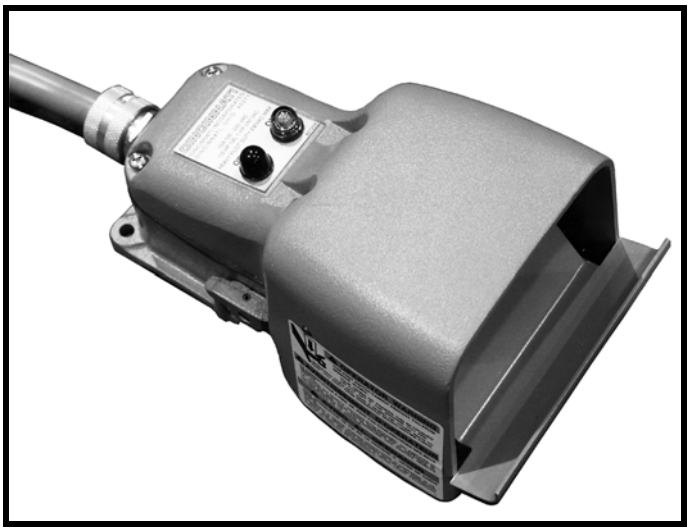


FIGURE 6-6 Footswitch (Handle removed for clarity)

ELECTRICAL ENCLOSURE

MAIN DISCONNECT SWITCH

This switch controls the incoming electrical supply to the machine. When turning the main disconnect switch from "ON" to "OFF" and then back to "ON", wait 10-15 seconds before switching back to "ON".

IMPORTANT: This 10-15 second delay is required to allow machine functions to reset properly.

FIGURE 6-7 Electrical Enclosure

FIGURE 6-8 Main Disconnect Switch

! WARNING !

THE CONTROL CONTAINS AN UNINTERRUPT-ABLE POWER SUPPLY (UPS). VOLTAGE MAY BE PRESENT IN SOME CIRCUITS EVEN THOUGH THE MAIN DISCONNECT IS OFF.

GROUND CONNECTED LIGHT

The low voltage circuit is a grounded circuit. The illuminated light indicates that the ground is connected. This is an internal chassis ground - it does not indicate that the machine is grounded.

FIGURE 6-9 Ground connection light

POWER SUPPLIES OPERATIONAL LIGHT

This indicates that the 24 volt power supply is operating correctly when lit.

FIGURE 6-10 24 Volt Power Supply operational light

ETHERNET CONNECTION

An Ethernet communications cable can be connected to the PROFORM control by routing the cable thru a sealed cord grip fitting in the side of the electrical panel and plugging the cable directly into the PC Ethernet connector on the CPU board. See Figure 6-11.

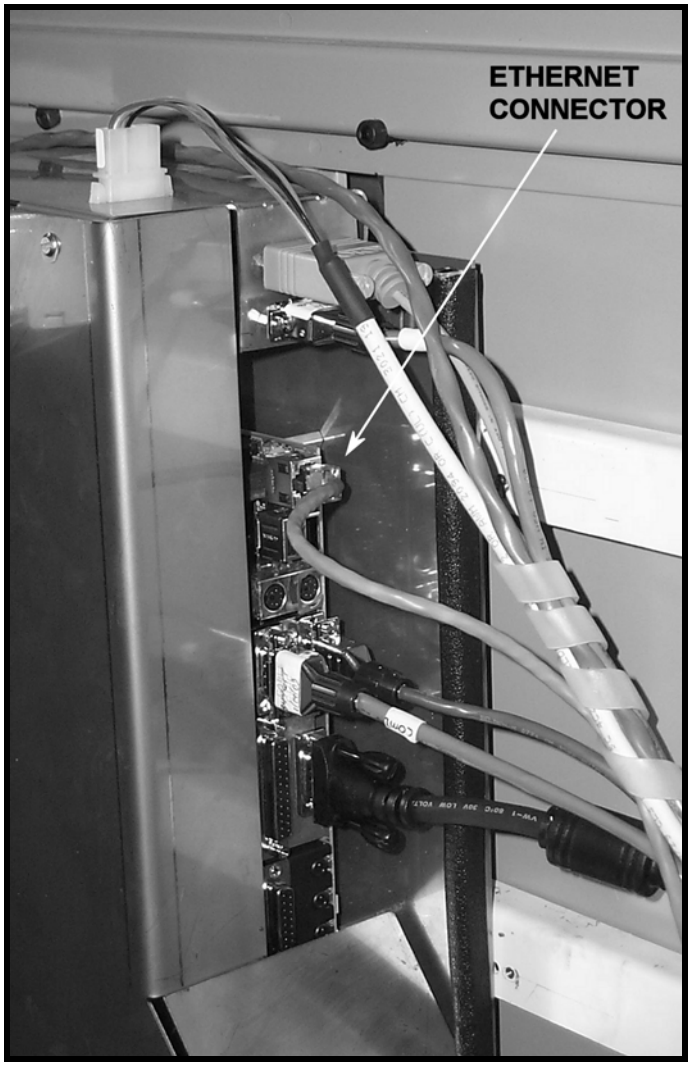


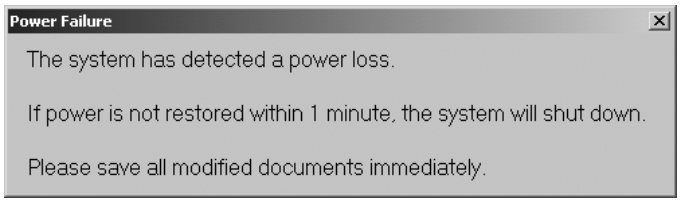
FIGURE 6-11 Ethernet connection

UPS (UNINTERRUPTIBLE POWER SUPPLY)

The UPS provides protection against sudden loss of power to the control and allows for an orderly shutdown of the PROFORM application and the Windows operating system.

FIGURE 6-12 UPS

In case of a power loss, including the normal shutdown of the machine with the Main Disconnect Switch, the UPS will begin beeping and the software will notify the user of the loss of power with a pop-up window.


Power Failure
The system has detected a power loss.
If power is not restored within 1 minute, the system will shut down.
Please save all modified documents immediately.

After about one minute, if power has not been returned in that time, the control will begin shutting down any running applications and the Windows operating system.

If power is restored within the first minute after power loss, shutdown will be aborted. A dialog will appear notifying the user of this event.

About two minutes after the actual shutdown procedure starts (or about three minutes after loss of power) the UPS will shut off power to the control.

Note: *Windows should be running when the Main Disconnect Switch is turned Off in order for the UPS to perform its shutdown procedure.*

If Windows is not running when power is lost, the UPS will attempt to keep power supplied to the system as long as possible. If this is the case, the UPS should be shut off manually using its power OFF button. At the next power-on following a manual power-off, the UPS will have to be manually turned ON before the control will power up.

! WARNING !

THE CONTROL CONTAINS AN UNINTERRUPT-ABLE POWER SUPPLY (UPS). VOLTAGE MAY BE PRESENT IN SOME CIRCUITS EVEN THOUGH THE MAIN DISCONNECT IS OFF.

SECTION 7 OPERATION

SEE SUPPLEMENT MANUAL EM-508 OR ONLINE HELP

FOR ADDITIONAL SETUP AND OPERATIONAL INFORMATION FOR THIS MACHINE, REFER TO EITHER THE ONLINE HELP INFORMATION THAT CAME WITH THE MACHINE SOFTWARE OR TO EM-508, "*SECTION 7, OPERATION – A SUPPLEMENT TO THE OPERATION MANUAL FOR THE CINCINNATI PROFORM PC CONTROL*", INCLUDED WITH THIS MANUAL.

SECTION 8 OPTIONS

ADDITIONAL OPERATOR STATIONS

One additional Palmbutton Operator Station and/or Footswitch can be installed on the PROFORM. See previous description of "*OPERATOR STATIONS" in SECTION 6 - MACHINE CONTROLS* for their operation.

AUTO CROWN

The Auto Crown option is a special bed with a variable proportional crown that automatically compensates for both bed and ram deflection for an applied centered load of any magnitude and length up to the nominal machine length. It causes the bed and ram to remain parallel in the loaded condition. With this device, the bend angle remains constant along the length of the bend.

A machine equipped with Auto Crown does not have a microcrowned bed. The bed top and ram nose are machined straight.

The bed is sandwiched between two auxiliary cross members. All three are pinned together at two places near the end of the bed as shown in Figure 8-1. A hydraulic cylinder is mounted in slots in the center of these three members. The top of the piston contacts the top of the slot in the bed. The bottom of the cylinder contacts the bottom of slots in the auxiliary cross members.

FIGURE 8-1 Auto Crown

The force developed by Auto Crown cylinder is proportional to the forming load. This force pushes up on the center of the bed. The cylinder is of such a size that its force is approximately twice as large as the forming load. The bed therefore deflects up an amount equal to the deflection of the ram. The result is that the bed and ram remain parallel and the upper die penetration is uniform along the bend length. Longer machines may have two Auto Crown cylinders.

BACKGAGES

Setup and operating techniques for the optional backgage are described in *SECTION 5*. Also described are the gage assemblies and fingers used with this backgage. Programming is described in *SECTION 7*.

CNC BACKGAGE

This backgage has a 24" (610mm) or 40" (1016mm) powered X-axis (front-to-back) whose position can be programmed by entering numerical data into the CNC Multi-Axis Control. The positioning speed is 1200 in/min. (508 mm/sec). Vertical adjustment up to 8" (203mm) either manually using a handwheel on each guide assembly or by a programmable powered adjustment with a positioning speed of 300 IPM. The CNC Backgage is designed for sheets up to 3/16" (3.8mm) maximum thickness that weigh less than 100 lbs. (45.4kg). It can be provided on shorter length press brakes. See Figure 8-2.

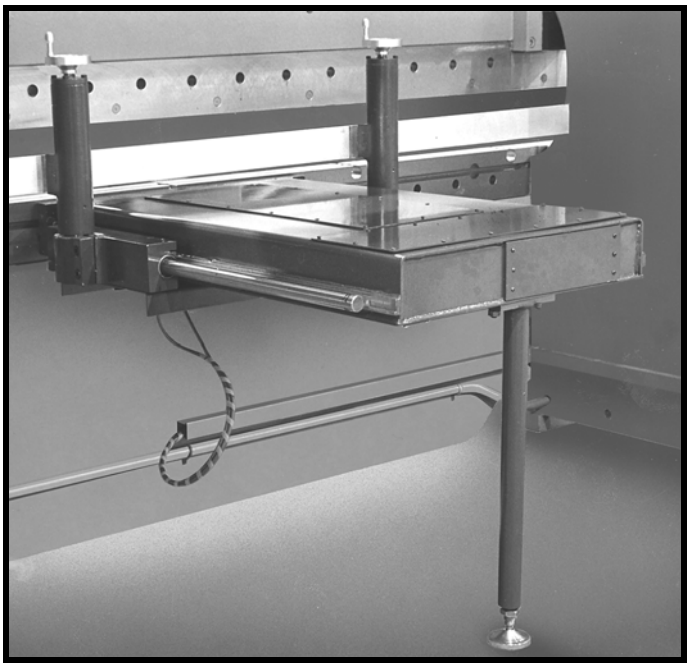


FIGURE 8-2 CNC Backgage

CNC HEAVY DUTY BACKGAGE

This backgage has a 24” (610mm) or 40” (1016mm) powered X-axis (front-to-back) whose position can be programmed by entering numerical data into the CNC Multi-Axis Control. The positioning speed is 1200 in/min. (508 mm/sec). This backgage has vertical adjustment up to 8” (203mm) either manually using a handwheel on each guide assembly or by a programmable powered adjustment with a positioning speed of 300 IPM. See Figure 8-3.

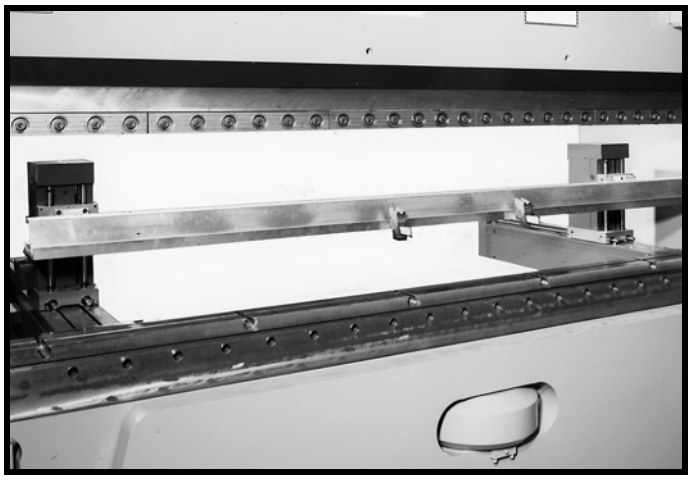


FIGURE 8-3 CNC Heavy Duty Backgage

The backgage is designed for sheets up to 1/4” (6.4mm) thickness that weigh less than 150 lbs. (68kg).

The CNC Heavy Duty Backgage is a dual X-axis drive unit which provides stability under load.

CNC PLATE BACKGAGE

This backgage is intended for applications where the majority of material is heavy sheets or plate weighing over 100 lbs. (45.4kg). It is a dual drive type with a 24” (610 mm), 40” (1016 mm), 64" (1626 mm), or 80" (2032 mm) range powered X-axis. The R-axis is 8” (203mm) programmable powered vertical adjustment. See Figure 8-4.

The Plate Backgage is programmable and can be positioned and sequenced in the horizontal X-axis and vertical R-axis.

FIGURE 8-4 CNC Plate Backgage

Two types of gaging surfaces are furnished with Plate Gages. Heavy duty gage blocks are non-adjustable hardened steel assemblies, which are generally recommended for gaging large sheets or plates (over 100 lbs./45.4kg). Standard gage assemblies consist of an aluminum body with an adjustable finger holder, which can be used to mount a variety of gage fingers. See Figure 5-9.

The gage finger assemblies should be positioned left-to-right to contact the part being formed at the desired gage points. Normally, the two gage finger assemblies should be spread as wide as possible to provide the most accurate gaging. The gage finger assemblies are moved along the gage bar by using the finger assembly positioning tool (Figure 5-14). This tool releases the gage assembly clamp and holds the assembly while it is moved. The finger assembly positioning tool can be used to position the gage assemblies from the front of the machine.

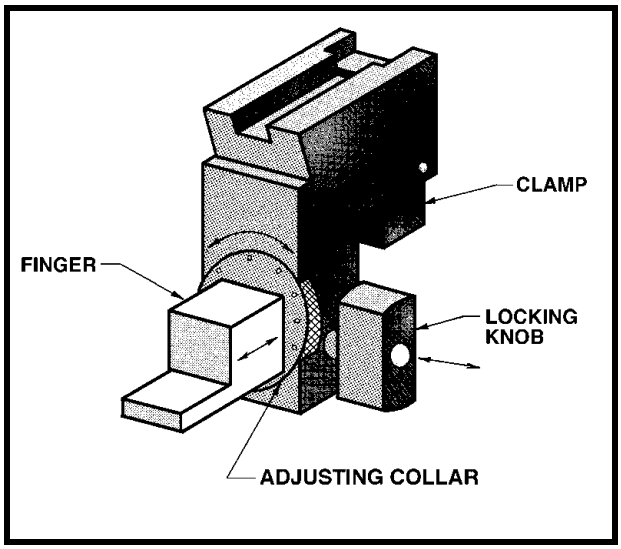


FIGURE 8-5 Gage assembly

Minor part flange differences (end-to-end) can be corrected by adjusting the individual gage fingers either forward (to shorten flange) or backward (to lengthen flange). First remove the gage assembly from the backgage bar. Loosen the finger by pulling out the locking knob (Figure 8-5) and turning knob counterclockwise. The adjusting collar has a total range of .060" (1.5mm).

Adjust the collar forward the desired amount. Reseat finger shoulder tightly against adjusting collar and tighten the locking knob.

Note: *The locking pin spins freely unless it is pulled out. This allows the knob to rest against the backgage face, thus preventing the finger from being unlocked while the assembly is in position on the gage bar.*

IMPORTANT: Do not use the standard gage finger assemblies when gaging plates or sheets that weigh over 100 lbs. (45.4kg). Damage to adjustable finger holder could result. Use Heavy Duty Gage Blocks for these applications. Never allow the workpiece to contact the aluminum gage bar. Bar damage could result.

Note that finger offset must be entered when using Heavy Duty Gage Blocks and other gage fingers which are not 3.000" (76.2mm) long. Procedure for entering FINGER OFFSET is described in EM-508, *SECTION 7, "SOFTWARE - GAGE PAGE, FINGER OFFSET"*. For Heavy Duty Gage Blocks, the offset is -3.000". Examples of finger offset values for some common applications appear in Figures 5-9 and 5-15.

Vertical position of the gage bar is controlled by PROFORM programs using the R-AXIS fields. The procedure for entering Bar Height into a program is described EM-508, *SECTION 7, "SOFTWARE - GAGE PAGE, R-AXIS"*. Sometimes it may be desirable to position the gage bar manually using the Remote Gage Pendant. Individual UP and DOWN switches on the pendant allow control of both ends of the gage bar.

The bar height will depend upon the shape of the part being formed. Care should be exercised when the gage bar is being positioned close to the dies or work supports to avoid interference.

The R-AXIS fields position the vertical height of the gage fingers. When the '"R" position is 0.000", the bottom of the Standard 1" (25.4mm) square finger will be 0.000" above the top of the lower die, except when using Unmeasured Tools. If non-standard fingers are normally used, consider modifying the Block Finger and/or Stop Finger objects in the CAD Dimensions tab of the Configuration dialog (see EM-508, *SECTION 7, "SOFTWARE"*. However, for special job setups, adjust the R-Axis fields the appropriate difference from Standard. Add to R-Axis positions any amount non-standard finger is lower than standard. Subtract any amount higher than standard.

The default position for R-Axis is 0.050" (1.27mm) above die.

IMPORTANT: Since the gage bar height on the Plate Gage is programmable, there is danger of collision between the gage bar and work supports. Special care should be taken when programming the gage with work supports.

4X BACKGAGES

Gaging surfaces furnished with the 4X Backgage include two standard gage assemblies, and two-1" (25.4mm) and two-1/4" (6.4mm) gage fingers. These fingers are shown in Figure 8-3.

The gage assembly adjusting collar is normally not used for 4X Backgage applications. The collar should adjusted to .00" and left in this position. Otherwise the programmed position could be off the amount the adjusting collar is turned out. See Figure 8-5. For 4X Backgages, minor adjustments to the part flange dimension can be made to X-AXIS Flange and Right Offset input dimensions in STANDARD gage mode (only available with 4X Backgages).

The 4X Backgage is programmed by X-Axis, R-Axis and Z-Axis inputs.

The actual position of the gage finger in relation to the tooling in the X-axis direction is determined by three program inputs. They are the Flange dimension, Gage

Allowance and Finger Offset. See Figure 5-15. To enter X-Axis positions, refer to the EM-508, *SECTION 7, "SOFTWARE - GAGE PAGE, X-AXIS".*

An R-Axis position is required for each step in a program. A dimensional value for each step of the program must be selected. The R-Axis position is illustrated in Figure 8-6.

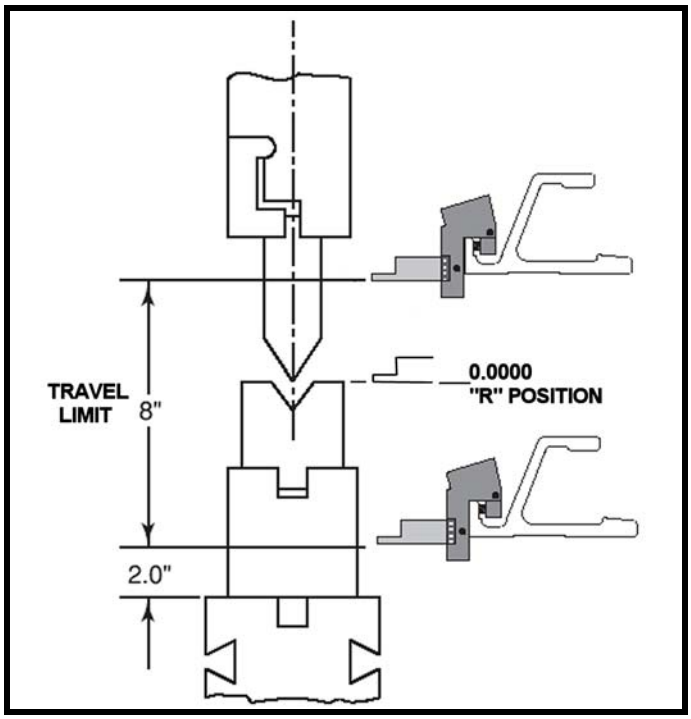


FIGURE 8-6 R-axis position

To enter R-Axis and Z-Axis positions, see EM-508, *SECTION 7, "SOFTWARE - GAGE PAGE, R-AXIS and Z-AXIS".*

The Z-Axis fields position the gage fingers horizontally left-to-right. The default values for Z-AXIS LEFT and RIGHT are the maximum left and right positions. These depend on the length of the machine.

A Z-Axis position is required for each step of a program. A dimensional value for each step of the program can either be selected or manually transferred to the program step. At the 0.000 position the center of the finger is at the center of the machine. Negative (-) numbers are to the left of center and positive (+) numbers are to the right.

Note: *On CNC 4X Backgages, the 'center of the finger' is assumed to be 0.75" (19mm) over from the inside edge of the respective arm's gage bar.*

For each bend being made the fingers should be spread as far as possible to provide the most accurate gaging.

SPECIAL STEP PROGRAMMING

IMPORTANT: In some special machine set-ups when multiple dies or special die sets (i.e. punching die with guide pins) are used, it is necessary to take special precautions when programming to prevent gage finger interference with the tooling.

When direct line movement of gage finger(s) along the Z or R-axis would cause a collision between the gage and tooling (Figure 8-12), a "dummy" (extra) step(s) should be added to provide a motion path around obstacles for the gage finger to follow. Extra steps can be added by setting the REPEAT at "0" for that step. This will allow the gage to cycle through the extra step without cycling the ram.

As shown in Figure 8-7, when moving from position "A" to position "B" along the Z-axis, possible interference could occur at the step between the dies unless an extra (dummy) step(s) is added. The extra step would first move the fingers backward and upward away from the dies. The bending step would then move the gage sideways and finally back into position over the higher die. This step would eliminate the gage/tooling interference.

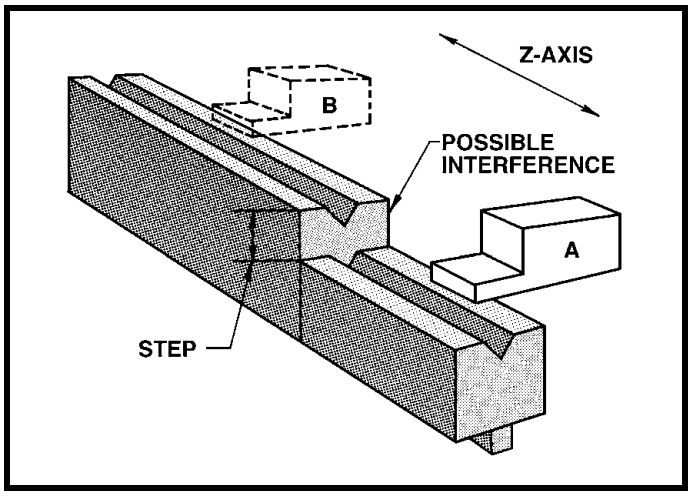
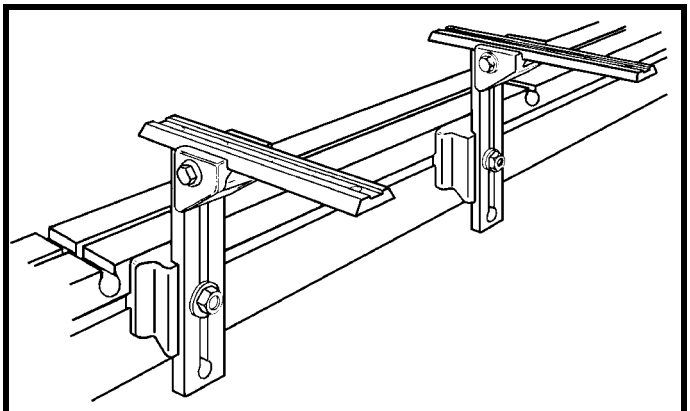


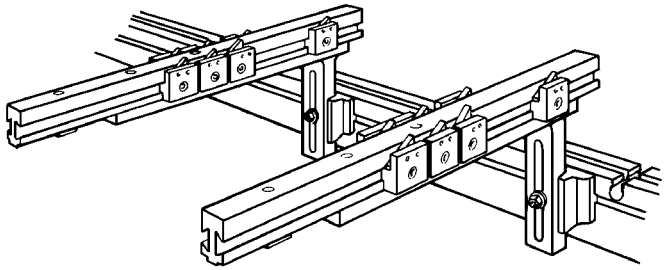
FIGURE 8-7 Special step programming

MANUAL FRONTGAGES

Fixed frontgaging and material supports are available for the PROFORM. Gage brackets and gage stops are manually set to position material for forming. Frontgage brackets without gage stops can also be used to support material. See Figure 8-8.



CINCINNATI Standard Gage brackets without stops can be used for work supports.



Adjustable Flip Finger Gages provide multiple gaging positions with complete flexibility in vertical and horizontal positioning. These gages are easy to set-up, are accurate, and save many hours of work handling. Flip Finger gage stop assemblies are located on either side of heavy duty gage bars. Any number of stops may be used.

FIGURE 8-8 Frontgage supports

POWER CLAMP

Power Clamp eliminates the need to loosen and retighten die clamp nuts when changing dies. Hydraulic power is used to unclamp the die holders. Once the dies are installed and POWER CLAMP is deactivated, powerful springs hold the dies in place. Power Clamps are available for the ram, bed or on both. See Figure 8-9. Operation is described in *SECTION 5 - SETUP & USE.*

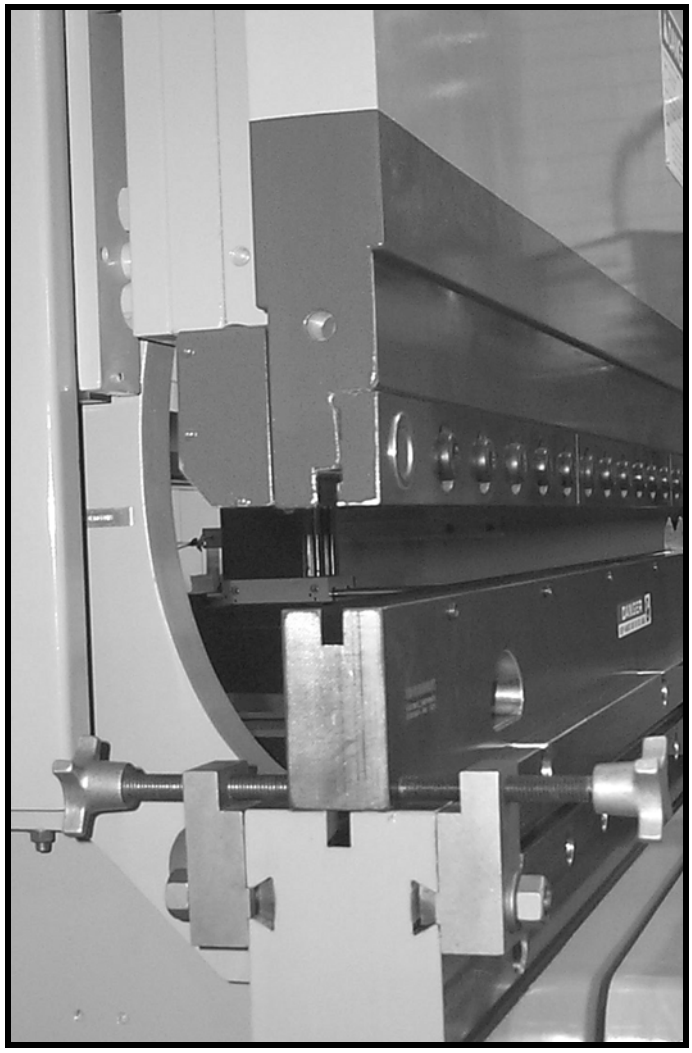


FIGURE 8-9 Ram Power Clamp

PRESENCE SENSING SAFE-GUARDING INTERFACE

This is a hardware/software package to interface the PROFORM PC Control with a customer supplied presence sensing device. The interface allows the customer's installed presence sensing device to interrupt a down stroke in STROKE mode when a person or an object is detected in the protected area, until the Guard Mute Position is reached. See EM-508, *SECTION 7, "SOFTWARE - RAM PAGE, GUARD MUTE POSITION" and "SOFTWARE - TOOLBAR BUTTON DESCRIPTION, QUICK BEND".*

The Guard Mute Position is the position in the ram's down stroke at which the presence sensing device is muted. At that point, the presence sensing device is no longer providing the point-of-operation guarding. When the device is muted (disabled), the operator can enter the guarded area to position or hold the workpiece.

The Interface option for presence sensing device includes pedestal mounting of the standard palmbutton operator station and mute indicator light. When the red GUARD OFF lights are illuminated, the presence sensing device is muted. See Figure 8-10.

Some presence sensing devices are programmable and allow a blanking window of variable size to be programmed from step-to-step. The PROFORM has an output available that can be configured as a step advance output to a programmable presence sensing device to take advantage of this feature.

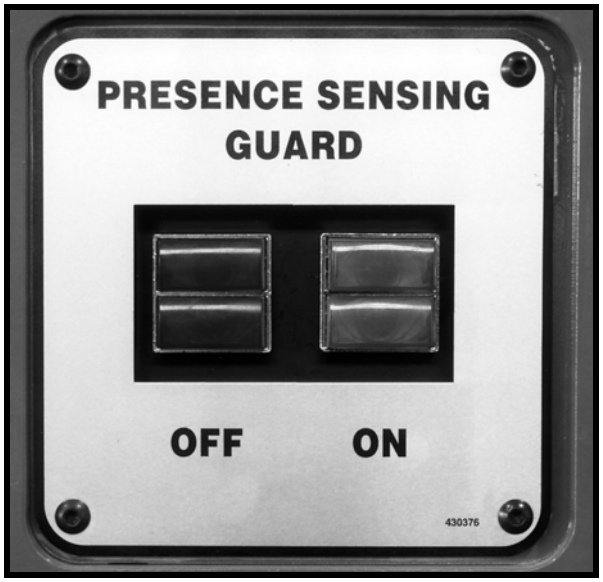


FIGURE 8-10 Mute Indicator Light for Presence Sensing Device

PROGRAMMABLE FOOTSWITCH

The Programmable Footswitch feature is used to select which footswitch must be pressed to cycle the ram when two or more footswitches are installed and turned on (active).

As opposed to selecting multiple footswitches in the Operator Stations dialog, the Programmable Footswitch option makes footswitch selection step-wise programmable. Any combination of footswitches may be selected for each step. See EM-508, *SECTION 7, "SOFTWARE - RAM PAGE, PROGRAMMABLE FOOTSWITCH"* for details on use and programming.

ETHERNET CONVENIENCE OUTLET

This connector on the side of the electrical enclosure is available to allow easy connection of an Ethernet cable to add the PROFORM PC Control to a network without special wiring into the electrical enclosure.

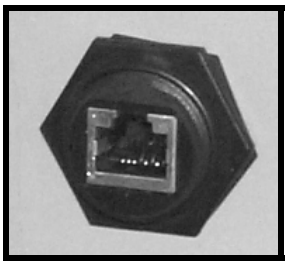


FIGURE 8-11 Ethernet Convenience Outlet

OIL COOLER

The optional oil cooler is an air-type heat exchanger. See Figure 9-13. The heat exchanger is equipped with a thermostatically controlled electric fan, which is operable only when the motor/pump is running. The thermostat is set to start the heat exchanger motor at approximately 135°F.

OIL HEATERS

Oil heaters are recommended for cold start-ups and cold running conditions. They are immersion-type and are thermostatically controlled. It will only maintain the oil temperature in the tank to permit machine start-up, they are not for heating up the oil. The thermostat is set to start the heater if the temperature falls below approximately 60°F.

OIL LEVEL/TEMPERATURE SWITCH

If the oil drops to the minimum allowable level, an error message appears on the touchscreen display. Stop machine operation as soon as possible. The cause for the low oil level should be found and corrected. Fill reservoir to the proper level.

If the operating temperature reaches the maximum level, an error message appears on the touchscreen display. Stop machine operation as soon as possible and locate the cause of the excessive heat. Excessive high temperature will cause the main drive to shut down.

SECTION 9 MAINTENANCE & ADJUSTMENTS

To maintain the accurate performance of your CINCINNATI PROFORM Hydraulic Press Brake, there are maintenance practices that should be followed. This section deals with the maintenance and adjustments of the Press Brake.

LOCKOUT / TAGOUT PROCEDURE

Note: *This procedure only covers the typical energies of a 90-350 PROFORM Hydraulic Press Brake. Special options, tooling and add-ons may have energy states that this procedure does not cover. It is the responsibility of your supervision to verify and establish the appropriate Lockout / Tagout Procedure for your specific machine.*

Before maintaining the machine, read and understand this OPERATION, SAFETY AND MAINTENANCE Manual. Refer to "SECTION 1 - IDENTIFICATION", Figure 1-1 and 1-2, and this section, "MAINTENANCE & ADJUSTMENTS", Figure 9-10 and 9-11, for item callouts.

1. Using SETUP mode of operation, carefully run the ram down until the dies are closed or until the ram is resting on support blocks. The ram supports must be able to withstand a minimum of 10% of the machine capacity without damaging the machine bed or ram.
2. Turn OFF the main drive motor by depressing the MAIN DRIVE STOP pushbutton on the PROFORM Control Pendant (Figure 1-3, Item 8).
3. Turn OFF and padlock the main disconnect switch (Figure 1-2, Item 13).
4. Locate Test Port #4 on the main manifold (Figure 9-11). Install a 0-5000 PSI range pressure gage with a female quick-disconnect and check for any hydraulic pressure trapped in the main manifold. Locate bleed valves on the counterbalance manifolds (Figure 9-10). Loosen locking nuts and open bleed valves for 5 seconds. Close bleed valves and tighten locking nuts. Allow the machine to sit for five minutes to let any internally trapped pressure bleed down.
5. **After maintenance is complete,** make certain that all pressure gages are removed from test ports (Figure 9-10 and 9-11). Check that the manual bleed needle valves are closed and the locking nuts are tightened.
6. Remove the padlock and turn the main disconnect switch ON (Figure 1-2, Item 8).
7. Turn ON the main drive motor by depressing the MAIN DRIVE START pushbutton on the PROFORM Control Pendant (Figure 1-1, Item 9).
8. Using the RAM UP button on the palmbutton operator station (Figure 1-1, Item 10), carefully run the ram up until any ram supports can be removed from the machine.

LUBRICATION

Refer to Figure 9-1 for machine lube point locations.

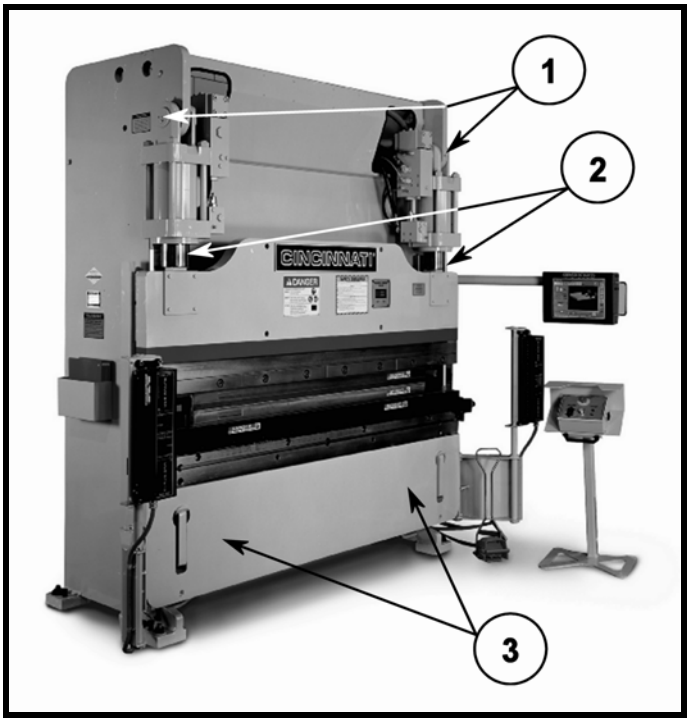


FIGURE 9-1 Lubrication points

1. Cylinder Head Clevis Pins: Lubricate grease fittings while cycling the ram under light load, such as obtained with a bumping die. Use No. 2 Lithium base grease with "moly" additive (C.I. grease H-2M). Lubricate once a month.
2. Ram Guides: Wipe clean and flush with light hydraulic oil once a month.
3. Auto Crown (Optional): There is a grease fitting at each of the pins through the bed and auxiliary plate (Not Shown, See Figure 8-1). These grease fittings are on the front end of the pins in a hole through the

pin retaining plates. The pins should be lubricated monthly. Use a No. 2 lithium base grease with a "moly" additive (C.I. grease H-2M).

BACKGAGES

Note: *The references to "spray lubricant" means to use "LPS #1" aerosol spray (C. I. #420924) or to spray a SAE #10 oil. All grease applications use No. 1 EP grease (C. I. grease H-1EP).*

CNC BACKGAGE (Optional)

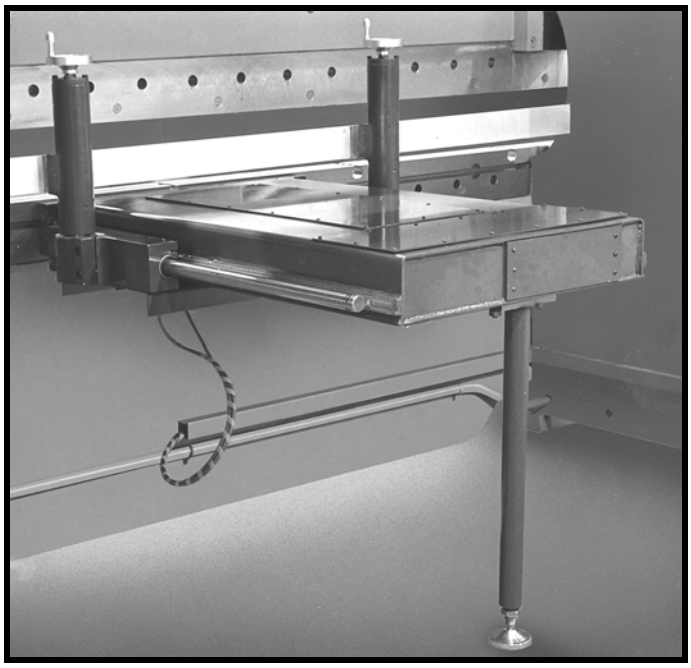


FIGURE 9-2 CNC Backgage Manual R-axis

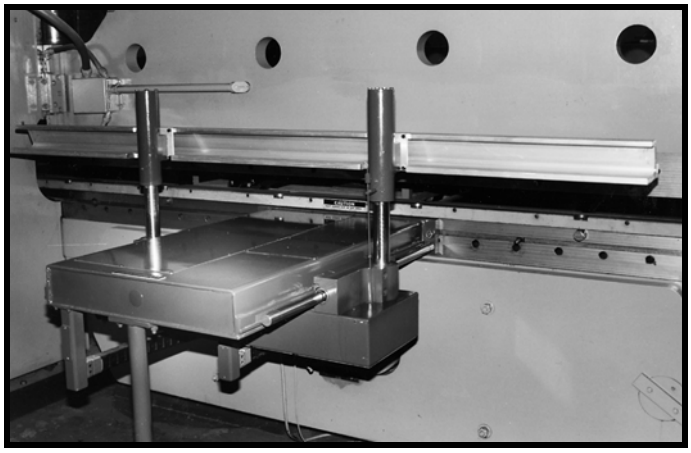


FIGURE 9-3 CNC Backgage Programmable R-axis

The following lubrication and cleaning should be performed every 200 hours of usage:

- Lube the X-axis screw located inside the main housing with spray lubricant. The screw may be accessed through a slot in the bottom of the main housing or it may be accessed from the top by removing the screws and top cover.
- Clean and apply spray lubricant to the pair of X-axis guide rods on the sides of the main gage housing.
- Raise the R-axis to the maximum up position. Clean and use spray lubricant on the exposed portions of both shafts.The R-axis screws on Manual R-axis gages are packed with grease at the factory. Disassembly of the gage is required for lubrication. If, for any reason, lubrication becomes necessary, contact the Service Department of CINCINNATI INCORPORATED.
- *Optional Programmable R-axis.* Raise the R-axis to the maximum up position. This will expose a lubrication access hole in the back of the vertical guide tube. The R-axis ballscrew will be visible through the access hole. Spray lubricant through the access hole to lubricate the ballscrew.

CNC HEAVY DUTY BACKGAGE (Optional)

- Clean and apply spray lubricant to the X and R-axis guide rods. See Figure 9-4.
- Grease the X and R-axis guide bearings using the fittings on the side of each carriage. See Figure 9-4.
- Apply grease under the gage bar tapering carriage leveling foot. See Figures 9-4 and 9-5.

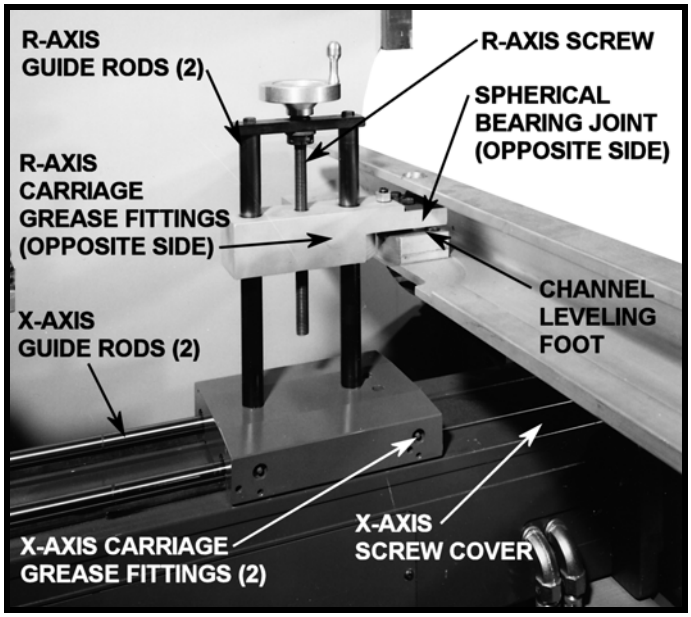


FIGURE 9-4 CNC Heavy Duty Backgage Manual R-axis

- Grease the gage bar tapering carriage/guide rods using the fitting on the side of the tapering carriage. See Figure 9-5.

- Grease the gage bar support arm spherical bearing joints using the fittings provided. See Figure 9-4 or 9-5.

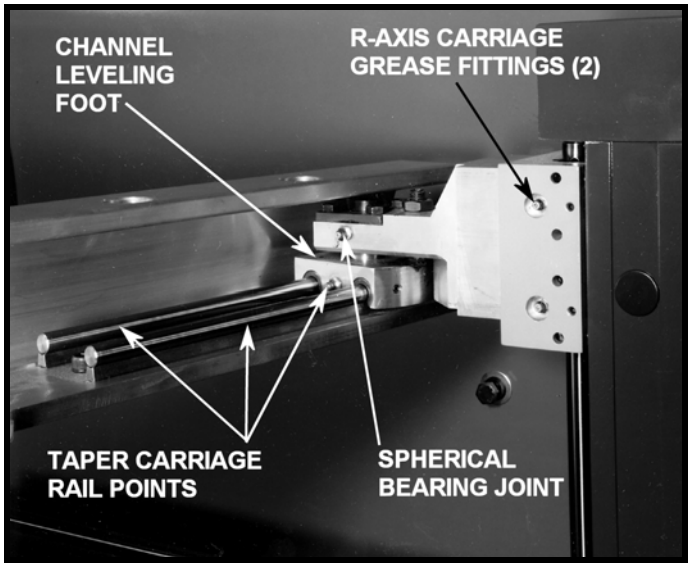


FIGURE 9-5 CNC Heavy Duty Backgage Programmable R-axis

- *Manual R-axis.* Apply spray lubricant to the R-axis drive screws.
- *Programmable R-axis (Optional).* Remove two screws from the top cover and remove top R-axis cover. Remove two screws from the front R-axis cover and remove the front R-axis cover. Apply spray lubricant to the R-axis ballscrews.
- Remove two screws from the end cover, two screws from the X-axis ballscrew cover and remove cover. Apply spray lubricant to the X-axis ballscrews.

CNC PLATE BACKGAGE (Optional)

- Clean gage and lubricate the two horizontal guide rails on each gage assembly with a thin coating of spray lubricant. See Figure 9-6.
- Lubricate the X-axis ballscrews inside the gage assembly by applying the spray lubricant through the slot in the side of each "X" housing.
- Clean and lubricate the pair of horizontal guides on the right end of the gage bar (viewed from rear) with spray lubricant.
- Grease vertical guide bushings using the fitting on the back of each casting.

  The R-axis screws are packed with grease at the factory. Disassembly of the gage is required for lubrication. If, for any reason, lubrication becomes necessary, contact CINCINNATI INCORPORATED Service Department.

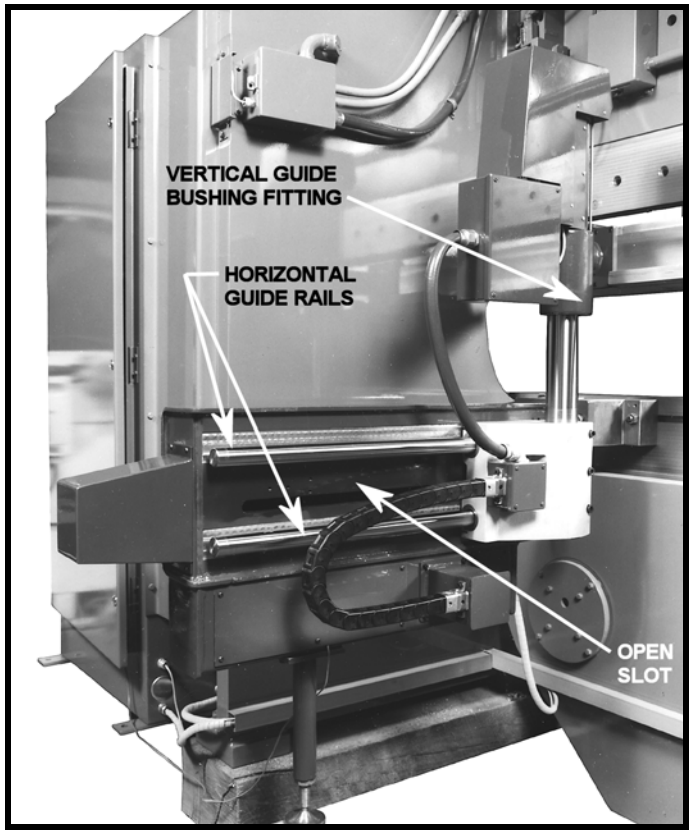


FIGURE 9-6 CNC Plate Backgage

CNC 4X BACKGAGE (OPTIONAL)

- Clean and apply spray lubricant to the X, R and Z-axis guide rods.
- Grease the X, R and Z-axis carriages using the fittings on the side of each carriage. There are a total of 24 fittings.
- Remove two screws from the top cover and remove the top R-axis cover. Remove two screws from the front R-axis cover and remove the front R-axis cover. Apply spray lubricant to the R-axis ballscrews.
- Remove two screws from the end cover, two screws from the X-axis ballscrew cover and remove cover. Apply spray lubricant to the X-axis ballscrews.
- Remove the screws and the covers protecting the Z-axis ballscrews. Apply grease to the fittings on the two ballscrew nut blocks.
- Apply spray lubricant to Z-axis ballscrews.

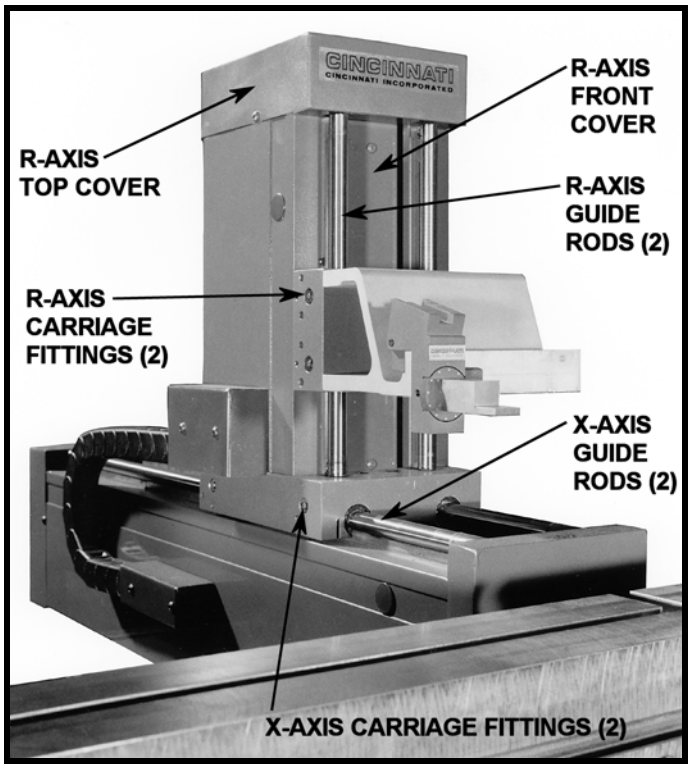


FIGURE 9-7 4X Backgage (Front View)

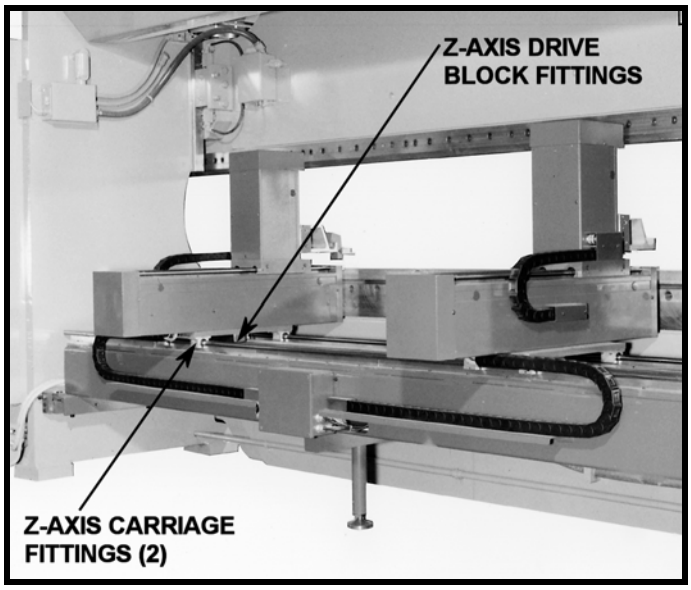


FIGURE 9-8 4X Backgage (Rear View)

HYDRAULIC OIL

The hydraulic reservoir should be filled to the center of the oil sight gage located at the rear of the reservoir. The filler cap is located on motor/pump mounting plate. The ram should be at the open height (refer to Figure 4-1). Use a light hydraulic oil, viscosity 150 seconds at 100°F (37.8°C) with anti-rust, anti-oxidation and anti-wear additives (C. I. oil B-150).

! WARNING !

STANDARD PRESS BRAKES ARE DESIGNED FOR AND SHIPPED WITH A PETROLEUM BASED HYDRAULIC FLUID. THIS IS FLAMMABLE. CHECK APPLICABLE FIRE CODES FOR SPECIAL PRECAUTIONS.

The Lubrication Recommendation chart furnished with this manual lists brand names and numbers which meet CINCINNATI" specifications. Extreme shop temperatures may require lighter or heavier oil than shipped with the machine and normally recommended. The allowable range of oil temperatures for different viscosity oils are shown in the following chart. Whenever the ambient room temperature is below 40°F (4.4°C), we recommend installing an oil heater in the reservoir to enable the oil pump to start-up in cold weather. Extremely cold environments below 32°F (0°C) will require additional measures to protect hydraulic system. Contact CINCINNATI INCORPORATED.

VISCOSITY GRADE AT 100°F (38°C)	START-UP 4000 SUS (860 cST)	RUNNING 250 SUS (54 cST) MAX.	RUNNING 70 SUS (13 cST) MIN.
150 SUS (32 cST)	11°F (-12°C)	80°F (27°C)	143°F (62°C)
215 SUS (46 cST)	22°F (-6°C)	94°F (34°C)	159°F (71°C)
315 SUS (68 cST)	32°F (0°C)	108°F (42°C)	177°F (81°C)

The following chart shows the reservoir capacity of CINCINNATI PROFORM Hydraulic Press Brakes.

MACHINE LENGTH	RESERVOIR CAPACITY GALLONS (LITERS)
6 FT.	125 (473)
8 FT.	170 (643)
10 FT.	215 (814)
12 FT.	260 (984)

It is very important to keep the oil clean. All precautions must be taken to keep the oil clean, free of chips, grit, water, sludge, etc. The oil should be drained and replaced after one year of service. Replace the oil sooner if sludge or other contamination is present. The drain valve is located in the bottom of the reservoir. This valve should be cracked once a month to remove any accumulated moisture. Check the oil level daily.

New oil stored in drums is usually not as clean as the filtered oil shipped with the machine. Oil should be pumped through a 3 micron filter. After the oil is changed the display should be checked periodically to see if a dirty filter error message appears. Change the filter element if required.

OIL FILTER

The high pressure oil filter is located on the top of the main manifold, which is on top of the main reservoir. See Figure 9-9. When the ram is moving, oil flows from the variable volume pump through the high pressure filter.

When the filter has reached its dirt holding capacity, an error message will appear on the display. The message will remain until the dirty element is replaced. The filter has a 3 micron (absolute) disposable element. To replace the filter, turn OFF the main drive motor and the disconnect switch on the main electrical enclosure and install a safety lockout. Remove the top cap on the filter and the dirty filter element. Install a new element and replace the top cap.

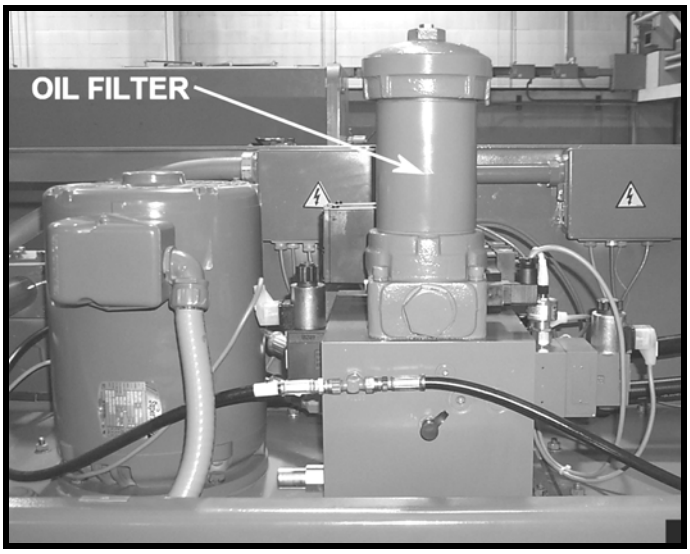


FIGURE 9-9 High pressure oil filter

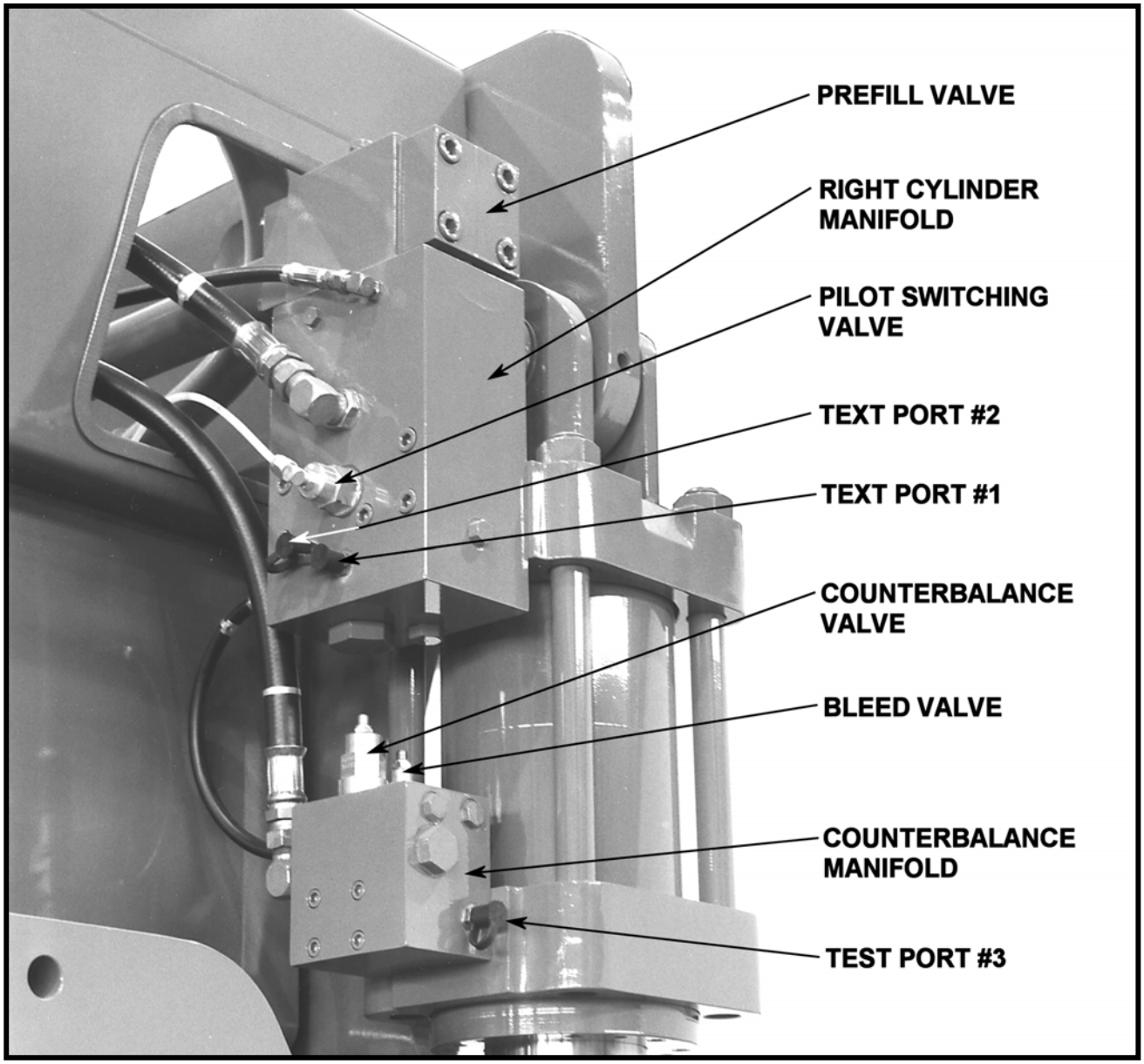
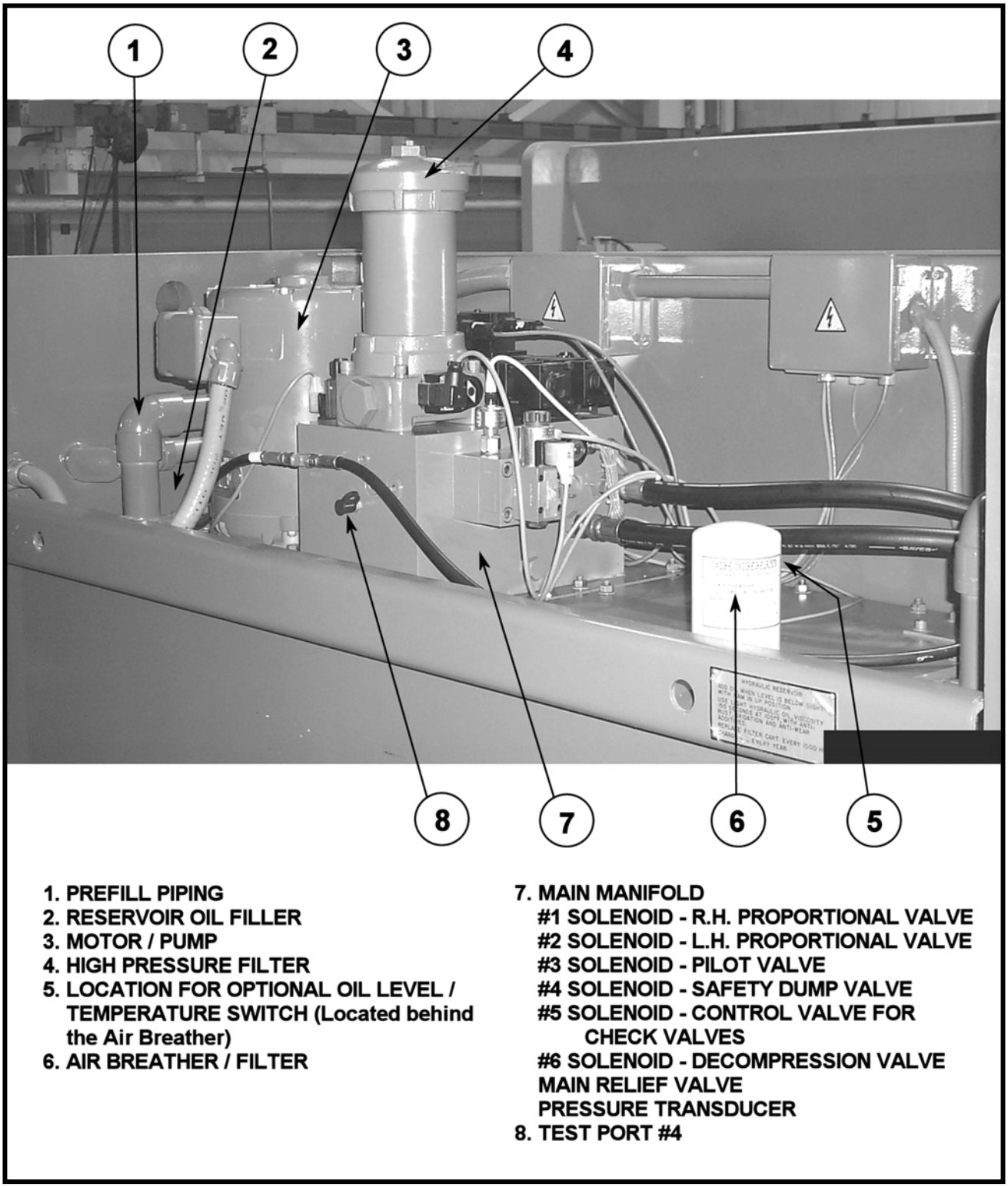


FIGURE 9-10 Counterbalance pressure check



1. PREFILL PIPING
2. RESERVOIR OIL FILLER
3. MOTOR / PUMP
4. HIGH PRESSURE FILTER
5. LOCATION FOR OPTIONAL OIL LEVEL / TEMPERATURE SWITCH (Located behind the Air Breather)
6. AIR BREATHER / FILTER
7. MAIN MANIFOLD
   #1 SOLENOID - R.H. PROPORTIONAL VALVE
   #2 SOLENOID - L.H. PROPORTIONAL VALVE
   #3 SOLENOID - PILOT VALVE
   #4 SOLENOID - SAFETY DUMP VALVE
   #5 SOLENOID - CONTROL VALVE FOR CHECK VALVES
   #6 SOLENOID - DECOMPRESSION VALVE
   MAIN RELIEF VALVE
   PRESSURE TRANSDUCER
8. TEST PORT #4

FIGURE 9-11 Hydraulic reservoir components

CHECKING & SETTING HYDRAULIC PRESSURES

The hydraulic system is equipped with male quick-disconnect fittings at the most frequently checked pressure test ports. Identification of the hydraulic system components is shown on Figure 9-10 and 9-11.

COUNTERBALANCE PRESSURE

CAUTION

All dies must be removed from press brake

Two test ports (#3) are provided in the circuit for checking counterbalance pressure. See Figure 9-10. No dies should be installed in the machine during this check.

1. Install 0-600 PSI range pressure gage with a female quick-disconnect into either left or right test port #3. **Both must be checked.**

2. Set the machine controls:

PALMBUTTON OPERATOR STATION 1	**ON**
PALMBUTTON OPERATOR STATION 2	**OFF**
FOOTSWITCH STATION 1	**OFF**
FOOTSWITCH STATION 2	**OFF**
MODE SELECT Selector	**STROKE**
OPERATOR CONTROL Selector	**ON**

3. Start machine by turning main disconnect ON and pressing MAIN DRIVE "START" button.

4. Select QUICK BEND by selecting the "Quick Bend" button.

5. Enter a program in QUICK BEND as follows:

TOP STOP	**max. value**
SPEED CHANGE	**max. value**
REVERSAL POS.	**min. value**
REVERSAL MODE	**POSITION**
REVERSAL TONS	**5.0**
FORMING SPEED	**15**
TILT	**0.0000**
DWELL	**0.0**
UP STOP	**OFF**
DOWN STOP	**OFF**

6. To cycle the machine, press the "Cycle Start" button. "CYCLE ACTIVE" will be displayed on the display.

7. The counterbalance pressure is checked while running the ram **down**. The proper pressure can be found in Figure 9-12. If the machine has a wide ram, extension(s) or very heavy upper dies, consult CINCINNATI INCORPORATED for information to set the counterbalance pressure.

8. To adjust the pressure, loosen the locknut and turn adjusting screw on counterbalance valve. Turn adjusting screw clockwise to increase and counterclockwise to decrease pressure. Tighten the locknut.

9. After setting the pressure, cycle ram a number of strokes and then recheck both counterbalance pressures.

10. Turn OFF motor/pump and remove pressure gage.

CAUTION

Do not leave gage permanently attached to test port.

CAUTION

Do not run the ram up with the gage attached

MACHINE SIZE	COUNTERBALANCE PRESSURE
90 x 6	234 PSI (1613 kPa)
90 x 8	285 PSI (1965 kPa)
90 x 10	380 PSI (2620 kPa)
90 X 12	470 PSI (3240 kPa)
135 x 6	215 PSI (1482 kPa)
135 x 8	245 PSI (1689 kPa)
135 x 10	285 PSI (1965 kPa)
135 x 12	335 PSI (2310 kPa)
135 X 14	390 PSI (2689 kPa)
175 x 6	215 PSI (1482 kPa)
175 x 8	260 PSI (1793 kPa)
175 x 10	290 PSI (2000 kPa)
175 x 12	365 PSI (2517 kPa)
175 X 14	475 PSI (3275 k Pa)
230 x 6	210 PSI (1448 kPa)
230 x 8	250 PSI (1724 kPa)
230 x 10	305 PSI (2103 kPa)
230 x 12	350 PSI (2413 kPa)
230 X 14	400 PSI (2758 kPa)
350 x 8	215 PSI (1482 kPa)
350 x 10	250 PSI (1724 kPa)
350 x 12	300 PSI (2068 kPa)
350 x 14	340 PSI (2344 kPa)

FIGURE 9-12 Counterbalance pressure

MAIN RELIEF PRESSURE

This pressure is controlled by a preset valve and cannot be adjusted. Contact a CINCINNATI Service Representative if this pressure must be checked.

AIR FILTER / BREATHER

See Figure 9-11. The disposable, canister-type air breather/filter should be replaced about every 2000 hours of machine operation.

HYDRAULIC UNIT OPTIONS

OIL COOLER

The oil cooler is an air-type heat exchanger. The heat exchanger is equipped with a thermostatically controlled electric fan which is operable only when the motor/pump is running. The thermostat is set to start the heat exchanger motor at approximately 135°F oil temperature. A furnace-type air filter is installed between the fan and the core of the exchanger. The filter should be changed as required. See Figure 9-13.

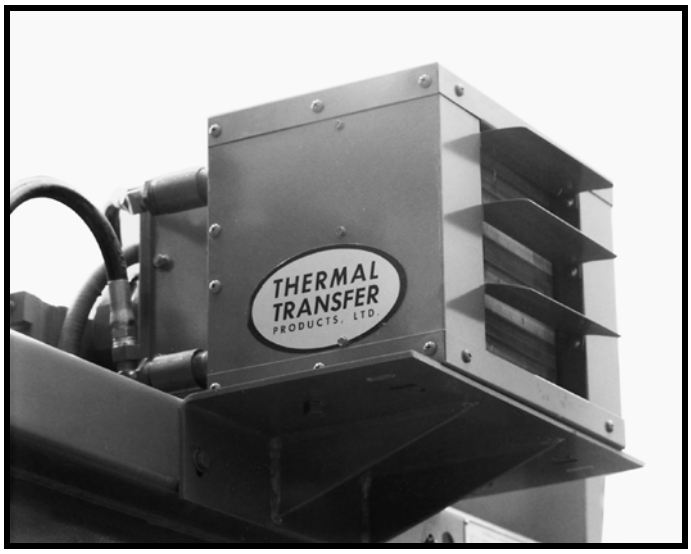


FIGURE 9-13 Oil cooler

OIL HEATERS

Oil heaters are recommended for cold start-ups and cold running conditions (See temperature chart in *"HYDRAULIC OIL"* Section). They are immersion-type, thermostatically controlled, and may be used independently of the motor drive.

OIL LEVEL / TEMPERATURE SWITCH

If the oil drops to the minimum allowable level, an error message appears on the display. This will turn OFF the main drive motor. The cause for the low oil level should be found and corrected. Fill reservoir to the proper level.

If the operating temperature reaches the maximum level, an error message appears on the display. Stop machine operation as soon as possible and locate the cause of the excessive heat.

CYLINDERS

Cylinders on the CINCINNATI PROFORM Press Brake have an inner and outer piston. See Figure 9-14. The inner piston is attached to the fixed upper cylinder head and does not move. The outer piston is attached to the ram, moving in the cylinder and in relation to the inner piston. For information to replace piston rod seals, contact CINCINNATI INCORPORATED Service Department.

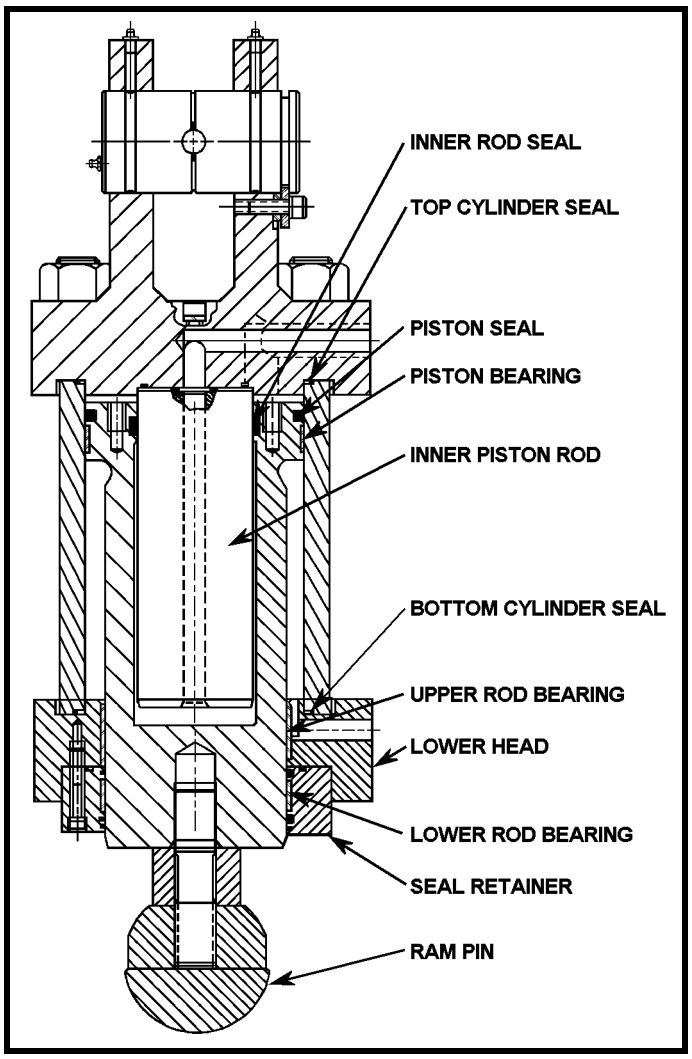


FIGURE 9-14 Cylinder assembly

MOTOR / PUMP

The motor/pump combination is vertically mounted on the reservoir top with the pump submerged in the hydraulic oil. The pump is a variable volume, pressure compensated piston pump with a load sensor control. The compensating and load sensor pressures are factory set and no adjustments are required.

VALVES

The hydraulic control valves are manifold mounted on the reservoir (Figure 9-11) and on both cylinders (Figure 1-1, Figure 9-10). The valves can be easily removed for service or replacement.

IMPORTANT: Whenever servicing these valves, the ram should be blocked, all power to the machine turned OFF, and the electrical disconnect locked.

SWIVEL END-GUIDE BEARING

To adjust for wear in the swivel end-guide bearings, loosen the locking screws. Adjust ram shoe clamp by tightening the adjusting screws evenly until they are snug. Back-off to obtain a .003" (.076mm) clearance between the bearing and the ram guide. Then tighten the locknuts and the locking screws. See Figure 9-15.

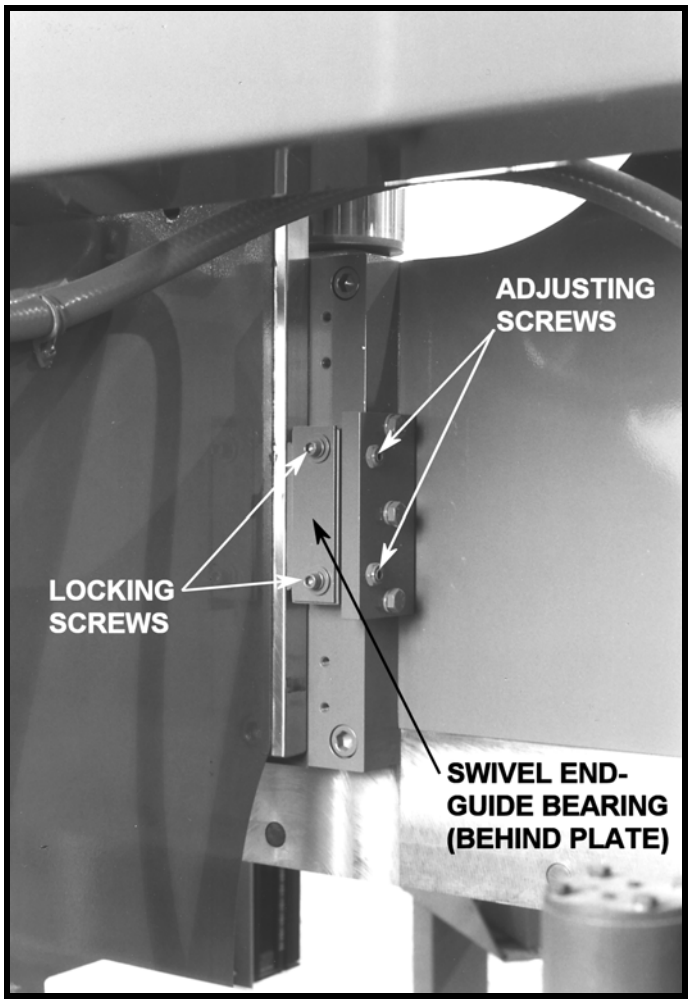


FIGURE 9-15 Swivel end-guide bearing

RAM LINEAR TRANSDUCER (POTENTIOMETER) ADJUSTMENT

IMPORTANT: This procedure must be done whenever the ram clamp bolts are loosened.

1. Set the machine controls:

PALMBUTTON OPERATOR STATION 1	**ON**
PALMBUTTON OPERATOR STATION 2	**OFF**
FOOTSWITCH STATION 1	**OFF**
FOOTSWITCH STATION 2	**OFF**
MODE SELECT Selector	**SETUP**
OPERATOR CONTROL Selector	**ON**

2. Start machine by turning main disconnect ON and pressing MAIN DRIVE START button.

3. Clean the bed top and place a 8.000" - 14.000" steel spacer (or any two identical length spacers taller than the minimum closed height of the machine) between the bed and ram at each end, in line with the transducer rods. Do not place the spacer under the ram die clamp. Both ends must be checked. See Figure 9-16.

CAUTION

All tooling, including filler block and lower power clamp (it so equipped) must be removed from the press brake.

4. Use the Palmbutton Operator Station to cycle the ram down and the RAM UP button to cycle the ram upwards.

FIGURE 9-16 Setting Linear Transducers

5. Jog the ram down until it is about .50" (12.7mm) away from the spacers.

6. Turn OFF main drive.

7. Use the bleed valves located on the cylinder manifolds (Figure 9-10) to allow the ram to drift down and rest on the spacers.

8. On touchscreen display menu bar, select "Maintenance". On pull down menus select

"Diagnostics, Encoder/Tonnage". This will display left and right ram positions.

9. If adjustment is required, remove the transducer guard and loosen adjusting screw locknuts. See Figure 9-17. Adjust threaded stud up or down until the ram position shows spacer height on the machine control.

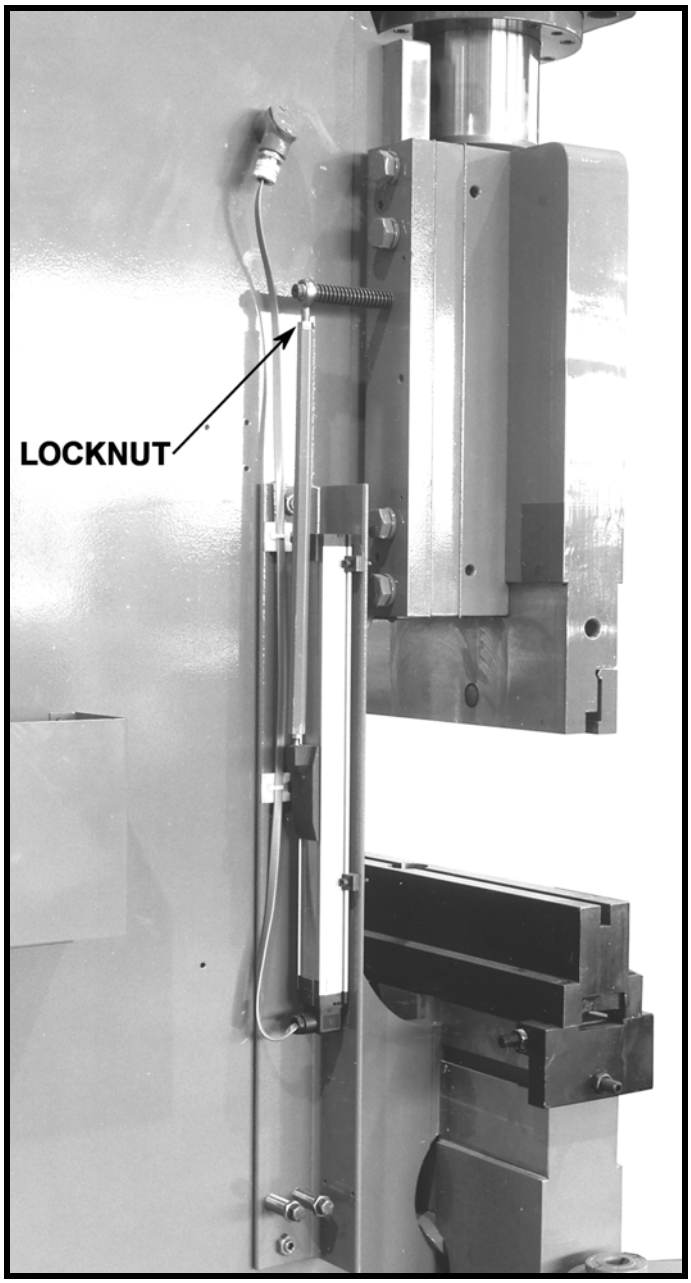


FIGURE 9-17 Linear Transducer

10. Tighten the adjusting screw locknuts.
11. Close the bleed valves.
12. Start the Main Drive.
13. Use the RAM UP button to raise the ram off the spacers.
14. Remove the spacers.
15. Re-install the guard removed in Step 9.

Note: *It is important that both ends are the same.(+/- .001")*

MACHINE LEVEL

The level of the machine should be checked every three months and adjusted if necessary. See *SECTION 2* for details of this adjustment.

ELECTRICAL

There are no customer serviceable parts in the main electrical enclosure. Contact a CINCINNATI INCORPORATED Service Representative for detailed information.

BACKGAGE INSTALLATION

CNC BACKGAGE (OPTIONAL)

This backgage consists of two gage fingers attached to a gage bar positioned by a drive assembly. The drive assembly can be programmed and positioned in two directions: X = front-to-back, R = up and down. X-axis is powered by a DC motor/ballscrew drive. R-axis can be either a manual or optional programmable drive. See Figure 9-18.

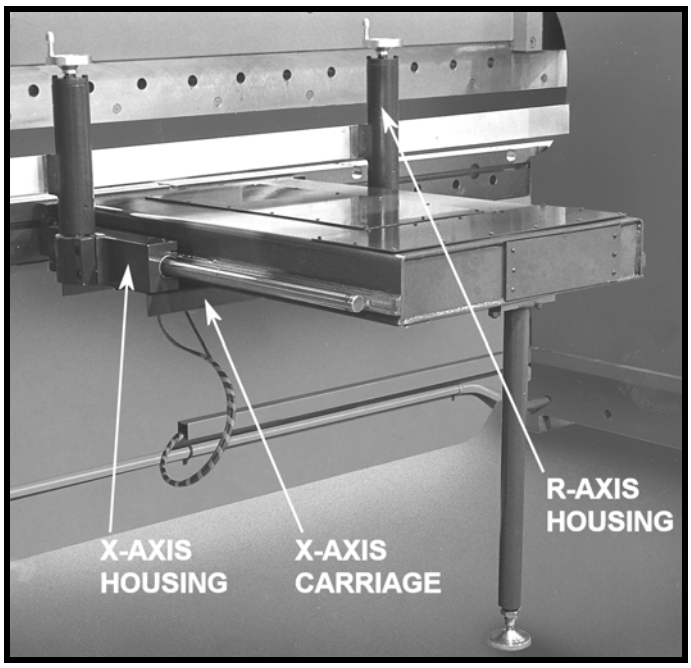


FIGURE 9-18 CNC Backgage

This gage is usually shipped assembled to the machine. If not, remove the major components from the crates and clean.

IMPORTANT: Do not install the gage or make electrical connections until a Service Representative of CINCINNATI INCORPORATED is present.

Install the backgage drive assembly to the rear dovetail slots of the press brake bed. Install the gage bar to R-axis arm assemblies. Center the gage bar between the housings by sliding the backgage drive assembly along the bed. Install the support leg to the backgage drive assembly. Level backgage drive assembly guide rails front-to-back by adjusting gage support leveling foot.

After start-up of the machine, the X-axis gage finger position and control readout should be checked. When the control displays 3.000" (76.2mm), the front edge of the fingers are 3.000" (76.2mm) ± .001" (.025mm) from the centerline of the ram die slot. Check in front of both R-axis housings. If a parallel adjustment is required, loosen the four screws bolting the X-axis carriage to the ballnut. If a skewed adjustment is required, also loosen the six screws bolting the X-axis carriage.

Remove covers as required to get access to carriage drive bolts. Position the gage finger against the 3.000" gage block as shown in Figure 9-23. Holding this position, retighten carriage drive bolts. Replace covers.

CNC HEAVY DUTY BACKGAGE (OPTIONAL)

This backgage consists of two gage fingers attached to a gage bar positioned by two drive assemblies. The drive assemblies can be programmed and positioned in two directions: X = front-to-back, R = up and down. Each axis is powered by a DC motor/ballscrew drive. Only "X" is powered as standard. See Figure 9-19.

Each of the major backgage components (the gage drive assemblies and gage bar) may have been removed from the machine at the factory and shipped in their own containers. Remove these items from their containers and clean.

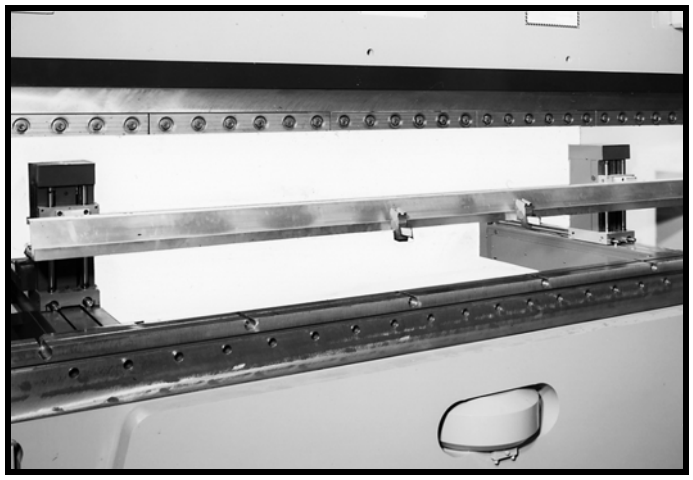
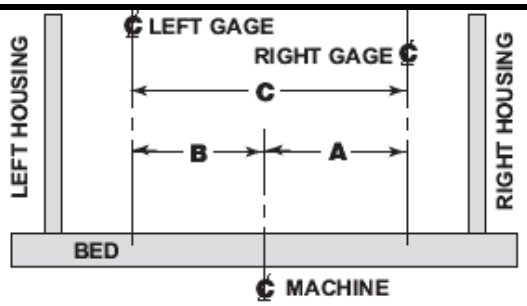


FIGURE 9-19 CNC Heavy Duty Backgage

Install the backgage drive assemblies to the rear dovetail slots in the bed as shown in Figure 9-19. Install the gage bar to the R-axis arm assemblies. It may be necessary to move the backgage drive assemblies in the dovetail slots to attach the gage bar. Center the gage bar between the housings by sliding the right hand drive assembly along the bed. Position the drive assemblies as shown in Figure 9-20. The left hand drive assembly should be positioned such that the 1-1/4" (31.8mm) diameter hole in the gage bar is centered over the 3/4" (19mm) diameter shoulder screws on the pivot arm.



NOMINAL LENGTH	24" GAGE		
	A	B	C
6' (1.8m)	29" (737mm)	25" (635mm)	54" (1372mm)
8' (2.4m)	35" (889mm)	40" (1016mm)	75" (1905mm)
10' (3.1m)	47" (1194mm)	54" (1372mm)	101" (2565mm)
12' (3.7m)	59" (1499mm)	61" (1549mm)	119" (3023mm)
14' (4.3m)	66" (1676mm)	66" (1676mm)	132" (3353mm)
	40" GAGE		
6' (1.8m)	28" (711mm)	16" (406mm)	44" (1118mm)
8' (2.4m)	35" (889mm)	34" (864mm)	69" (1753mm)
10' (3.1m)	47" (1194mm)	48" 1219mm)	95" (2413mm)
12' (3.7m)	58" (1473mm)	62" (1575mm)	119" (3023mm)
14' (4.3m)	66" (1676mm)	66" (1676mm)	132" (3353mm)

FIGURE 9-20 CNC Heavy Duty Backgage drive assembly positions

After start-up of the machine, the Heavy Duty Backgage final alignment should be made. Gage finger positions and control readouts should be checked and adjusted as follows.

1. X-axis (See Figure 9-21) - Front edge of fingers are 3.000" (76mm) ± .001" (.025mm) from the centerline of the ram die slot when the control displays 3.000" (76mm). Adjust X-axis position by loosening carriage drive bolts (as shown in Figure 9-22). Position the gage finger against the 3.000" (76mm) gage block as shown in Figure 9-23. Holding this position, retighten the carriage drive bolts.

2. Optional Programmable R-axis (See Figure 9-24) - Bottom of the fingers are 10.000" (254mm) ± .005" (.13mm) above the bed when control displays 10.000" (254mm). R-axis position can be adjusted by loosening the 3/8"-16 hex bolts which attach the R-axis carriage to the ballscrew nut. These bolts are accessible through the 7/8" (22mm) diameter holes near the top of the R-axis housings. Using the R-axis adjustment tool (#430100-C), rotate the handle until the proper height is determined, retighten the drive bracket hex bolts.

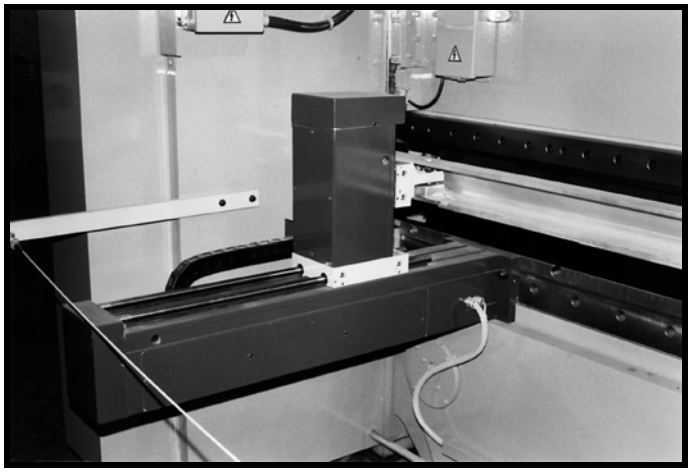


FIGURE 9-21 X-axis travel front-to-back

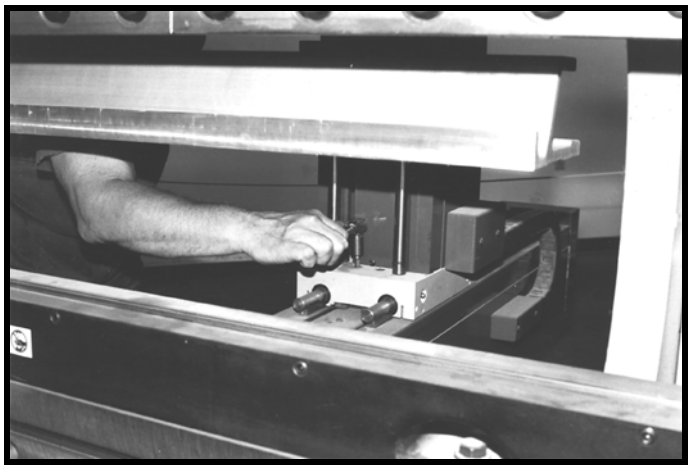


FIGURE 9-22 Loosen X-axis carriage drive bolts

FIGURE 9-23 Gage finger against 3.000 gage block

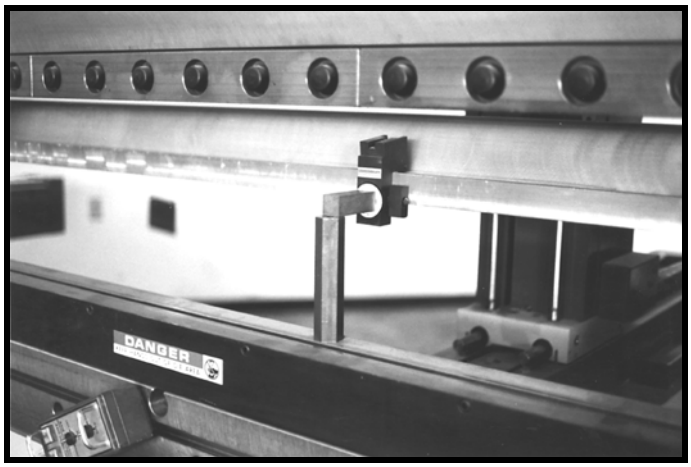


FIGURE 9-24 Check R-axis gage finger setting

CNC PLATE BACKGAGE (OPTIONAL)

The CNC Plate Backgage is an optional feature which provides PROFORM control capability for plate forming applications.

This gage is shipped disassembled from the machine. Remove backgage guide assemblies, bed adapters and gage bar from packing boxes. Remove any protective wrapping and clean the parts.

As viewed from the front, the right backgage guide assembly has a flat plate for a rigid mounting to the gage bar (see Figure 9-6). The left assembly has a bearing block for a sliding mount to the gage bar. Identify the right and left bed adapter by matching the number stamped on the adapter with the number stamped on the top of the guide assembly front flange. Use the roll pin holes in bed to locate bed adapters. Assemble adapters on dovetail bolts, tighten nuts and install roll pins.

Bolt each guide assembly to the bed adapter stamped with the same number. These units are heavy and a lifting device must be used to position them. The guide assembly must be leveled and the support leg adjusted for each unit. Place precision level on upper guide rail and adjust leveling screw on support leg to raise or lower rear of backgage guide assembly as required. Tighten leveling screw locknuts when finished.

Install gage bar by inserting horizontal guides into left mounting block. Mount right end of bar to mounting plate using cap screws provided.

Do not make any electrical connections. This will be done by a CINCINNATI INCORPORATED Service Representative.

Clean the horizontal guide rails and lubricate with a light coat of spray lubricant.

CNC 4X BACKGAGE (OPTIONAL)

This is a CINCINNATI INCORPORATED PROFORM option consisting of two semi-independently positioned gage fingers. There are four programmable axes; R (Up and Down), X (Front to Back), Z-Left and Z-Right (Left to Right). There is a programmable offset feature between the two fingers for the X-axis. Each axis is powered by a DC motor/ball screw drive as shown in Figure 9-25. Each of the major backgage components (the gage assembly, control enclosure and the rear guard) may have been removed from the machine at the factory and shipped in their own containers. Remove these items from their crates and clean.

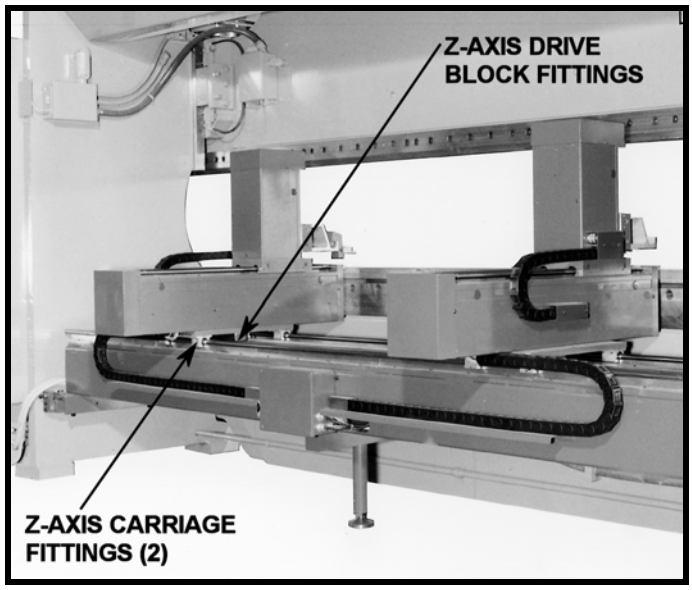


FIGURE 9-25 CNC 4X Backgage

IMPORTANT: Do not install the gage, rear guard or make electrical connections until a CINCINNATI INCORPORATED Service Representative is present.

The gage assembly is installed between the machine housings by setting it on the mounting block level screws. Tighten the front-to-back and left-to-right alignment screws and tighten holddown bolts as shown in Figure 9-26. Final alignment of the gage to the machine should be made after electrical connections have been completed and the gage is operable.

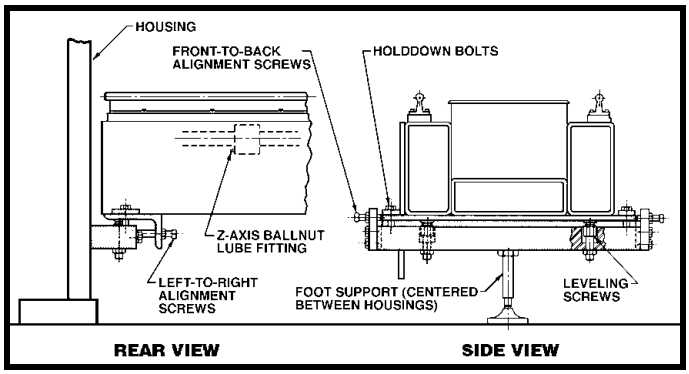


FIGURE 9-26 CNC 4X backgage Installation

Clean the Z, R and X-axis ball bushing guide rails and lubricate with a spray lubricant.

After start-up of the machine the following CNC 4X Backgage final alignments should be made.

1. Z-axis travel should be parallel to the bed top within .004" (.102mm) as shown in Figure 9-27.

2. Z-axis travel should be parallel to the ram die seat (front-to-back) within .002" (.051mm) at both ends as shown in Figure 9-28. For machines equipped with Power Die Clamps, use the finished surface on the front of ram nose above die clamps.

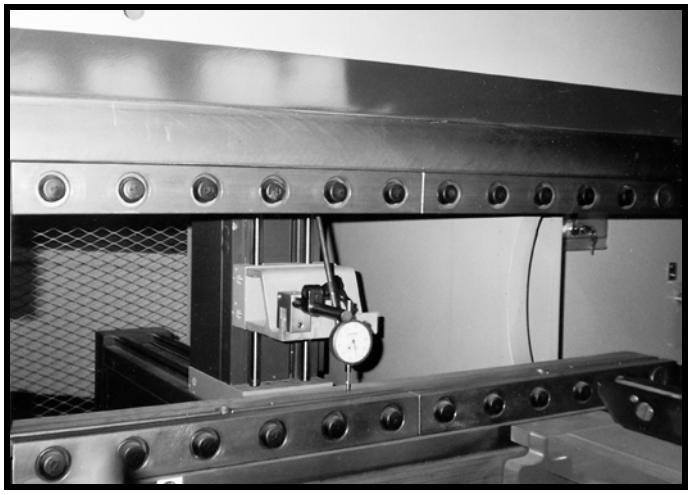


FIGURE 9-27 Z-axis travel left-to-right

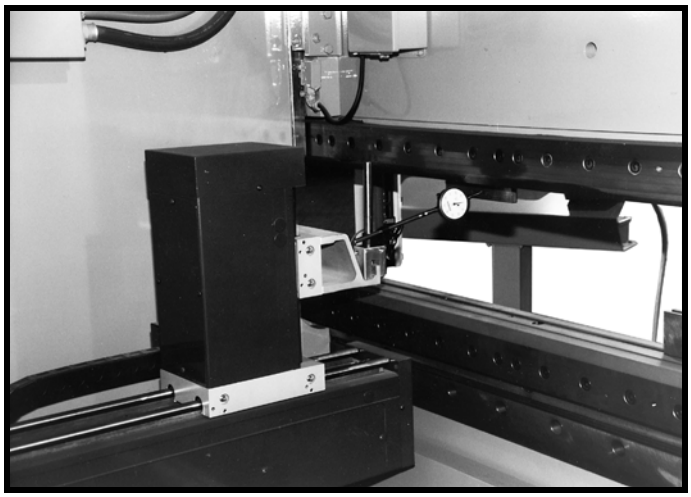


FIGURE 9 - 28 Z-axis parallel to ram die seat

3. R-axis travel should be perpendicular to the bed top within .002" (.051mm) over 8" (203.2mm) of travel as shown in Figure 9-29.

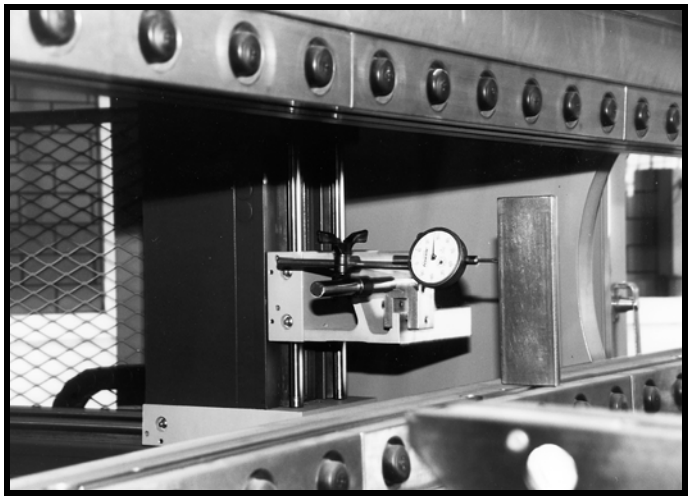


FIGURE 9-29 R-axis travel up and down

These settings are changed by adjusting the left-to-right and front-to-back leveling screws and the center foot support as shown in Figure 9-26.

Gage finger positions and control readouts should be checked and adjusted as follows. (Select Maintenance/Diagnostics/Gage Positions to view Control displays.)

1. R-axis - Bottom of the fingers are 10.000" (254mm) ± .005" (.13mm) above the bed when control displays 10.000" (254mm). R-axis position can be adjusted by loosening the 3/8"-16 hex bolts which attach the R-axis carriage to the ballscrew nut. These bolts are accessible through the 7/8" diameter holes near the top of the R-axis housings. Using the R-axis adjustment tool (#430100-C), rotate the handle until the proper height is determined, retighten the drive bracket hex bolts.

2. X-axis - Front edge of fingers are 3.000" (76.2mm) ± .001" (.025mm) from the centerline of the ram die slot when the control displays 3.000" (76.2mm). Adjust the X-axis position by loosening carriage drive bolts as shown in Figure 9-22. Position the gage finger against the 3.000" (76.2mm) gage block as shown in Figure 9-23. Holding this position, retighten carriage drive bolts.

3. Z-axis - center of gage fingers should be within .010" (.25mm) of machine centerline when control displays 0.000" and gage finger is positioned on R-axis mounting channel as shown in Figure 9-30. Move finger along channel to adjust position.

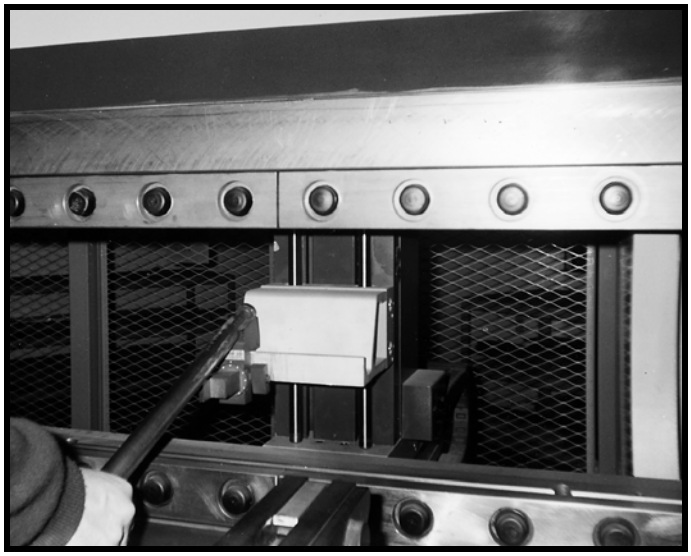


FIGURE 9-30 Z-axis, align center of gage fingers

The rear guarding (fence) should be attached to the rear of the housings and the floor, before any further programming or tool installation is made. See Figure 9-31. Level the fence and anchor with four 3/8" bolts.

IMPORTANT: An interrupt switch is attached to the rear guard gate. Opening the gate stops ram and gage operation. Check the operation of this switch.

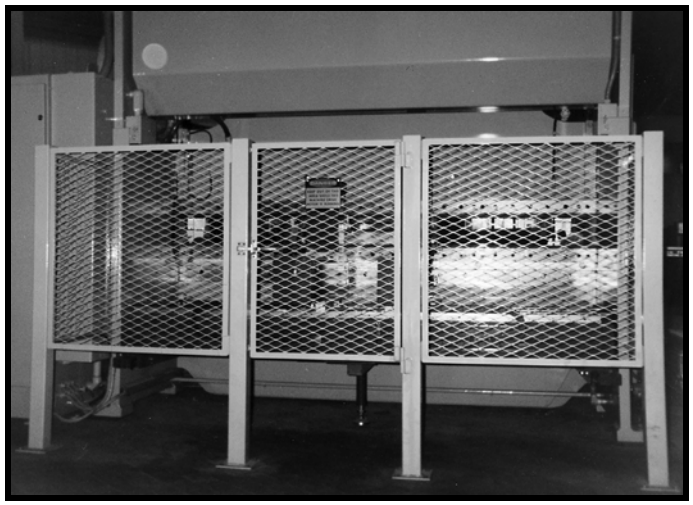


FIGURE 9-31 Rear guarding

CARRIAGE ADJUSTMENT

The X-axis, R-axis and Z-axis carriage ball bushings should be checked periodically for looseness. Each ball bushing has a preload adjusting screw (Figure 9-32). These screws should be snug**, never tight**.

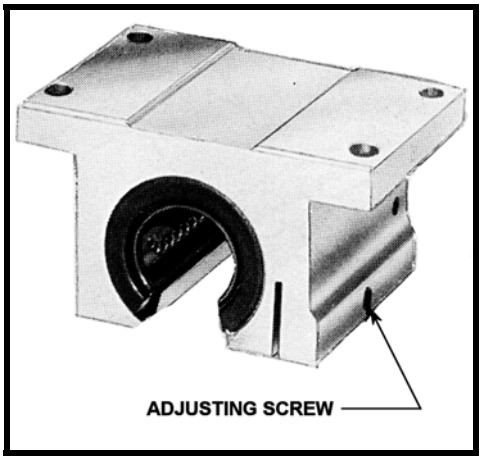


FIGURE 9-32 Backgage arriage ball bushing

TROUBLESHOOTING

Effective troubleshooting is usually acquired with experience and by a thorough knowledge of the machine and its operation. The assembly drawings, including hydraulic and electrical schematics (included with this manual), should be used as troubleshooting aids. Most problems, however, can be more efficiently diagnosed by contacting your local CINCINNATI Field Service Representative or through telephone support with a Technical Service Specialist. Having the following information ready before making contact with a CINCINNATI Representative will help to diagnose the problem faster.

- Company Name

- Machine Model
- Machine Serial Number
- All error messages (exactly as displayed)
- Have this manual and prints available for reference
- Describe the symptoms of the problem from the following list. Problem diagnosis will go quickly if you can answer the questions associated with each symptom.

LCD DISPLAY ERROR MESSAGES

Note: *Refer to either the online help information that came with the machine or to* ***EM-508****, "SECTION 7, OPERATION - A SUPPLEMENT TO THE OPERATION MANUAL FOR THE CINCINNATI PROFORM PC CONTROL", included with this manual.*

POWER-UP TEST ON CPU BOARD

The following describes the Power-Up self-tests and diagnostics on the PROFORM.

ON POWER-UP

A “c” is displayed on the CPU on-board LED while a Checksum test of the upper and lower EPROM is performed. If a failure occurs, the LED display will indicate the 'Fnnn' error code as described under the “User Initiated Self-Test”. The control will not function if an error occurs.

USER INITIATED SELF-TEST

The self-test procedure will be activated if the ABORT button (next to the LED) on the CPU board is held down while the RESET button (next to the batteries) is pressed, then released. See Figure 9-33. At the beginning of each test, the least significant digit of the test number will be flashed on the LED digit. At the first failure, the letter “F” and the failed test number will be rotated continuously on the LED display. The decimal point will be flashed to separate digits. To resume testing at the next test, the ABORT button may be pressed. If all the tests are completed without a failure, a “P” will be displayed on the LED. If any of the tests fail and testing is resumed, the LED will display an “F” when all tests have been performed.

It will be necessary to RESET the control after running the self-test.

The following tests will be performed:

1. SRAM Nondestructive Test

   011) Address Line

   012) Data Line

   013) Byte Test

   014) Word Test

   015) Long Test

2. EPROM Test

   021) Read of Complete Range

   022) CheckSum Upper Device

   023) CheckSum Lower Device

3. SCC Serial Controller Chip

   031) Polled Mode Loop Back on Port A

   032) Polled Mode Loop Back on Port B

   Example: If Test 012 should fail, the LED will blink:

   F . 0 . 1 . 2

It will repeat this until the ABORT button is pressed to continue with the next test.

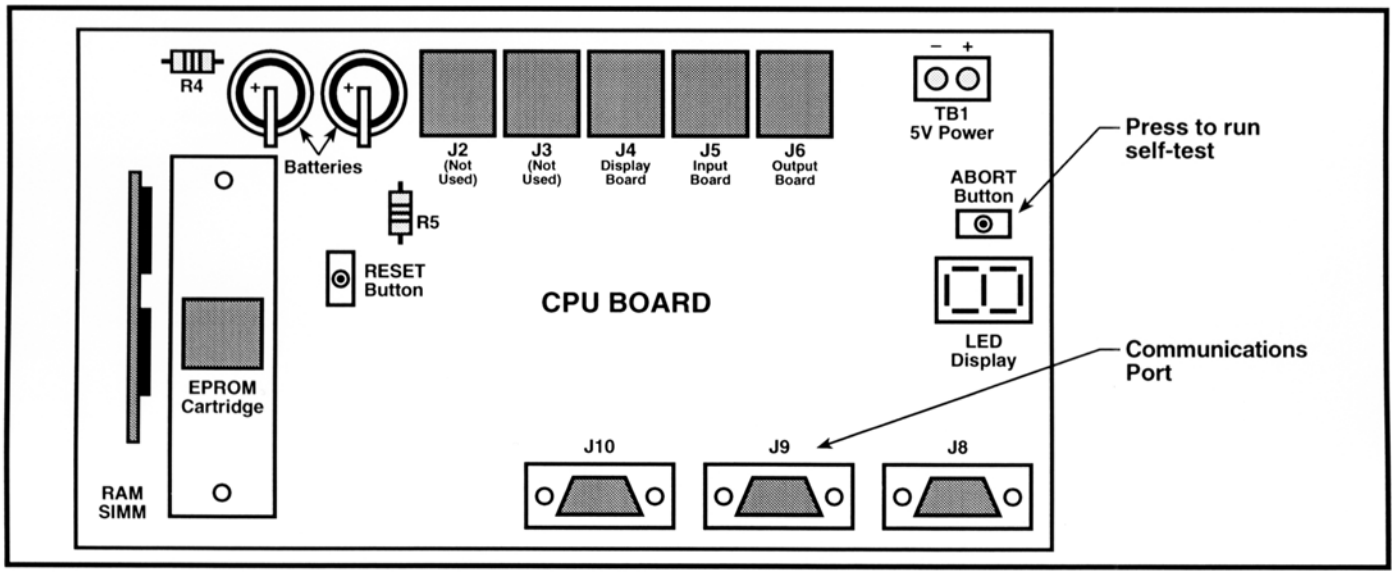


FIGURE 9-33 Recommended Configuration for Convenience Outlet

MAINTENANCE CHECKLIST - PROFORM PRESS BRAKE

	LUBRICATION SCHEDULE	DAILY	WEEKLY	MONTHLY	3 MONTHS	6 MONTHS	YEARLY
1	Check reservoir oil level.	X					
2	Lubricate cylinder clevis pin.			X			
3	Clean and flush ram guides with oil.			X			
4	Check for water in reservoir.			X			
5	Lubricate backgage guide rails, bearings and drive screws			X			
6	Lubricate Auto Crown® pins (option).			X			
7	Drain, clean and refill hydraulic reservoir.						X
8	Lubricate gage bar leveling foot.				X		
	CHECK OR ADJUSTMENT						
1	Check entire machine for loose fasteners – tighten if necessary.	X					
2	Wipe entire machine clean.			X			
3	Check machine levelness.				X		
4	Check ram guide clearance – re-level if necessary.				X		
5	Adjust swivel end-guide bearings.				X		
6	Replace oil pressure line filter element.	**WHEN INDICATED**					
7	Clean strainer in water line to heat exchanger (if so equipped).					X	
8	Replace filter in air-cooled heat exchanger (option).					X	
9	Replace reservoir air filter – breather.						X
10	UPS battery should be replaced every two (2) years.						

ABOVE INTERVALS ARE BASED ON ONE SHIFT AND NORMAL PRESS BRAKE OPERATION.
DETAILED INSTRUCTIONS FOR SERVICING THE MACHINE CAN BE FOUND IN THIS MANUAL.

SECTION 10 SERVICE AND PARTS

ORDERING REPAIR PARTS

When ordering repair parts be sure to give this information:

1. Serial number of the PROFORM Press Brake. This is located on the machine's capacity plate and on the right end of the bed.
2. The part number and part name, obtained from assembly drawings included with this manual.
3. As complete a description of the part as possible.
4. Delivery required.
5. It is sometimes necessary to furnish subassemblies instead of single parts. In such cases, we reserve the right to ship and to invoice accordingly.

RETURNING PARTS FOR CREDIT

1. No item is to be returned without prior authorization. Please write or call (513-367-7100) the factory for instructions and the returned goods authorization number.
2. Returned goods authorization number must be shown on the **outside** of the package being returned. Unauthorized shipments will be returned to the sender freight collect.

SERVICE

CINCINNATI INCORPORATED Service includes:

1. Established field service having numerous local offices for prompt service assistance. Factory trained servicemen are available to assist you with any service problems you might be having. This includes service ranging from minor repairs and adjustments to major reconditioning jobs.
2. Planned Maintenance Service (PMS). This is a program designed to give you comprehensive inspections and recommendations concerning the condition of your equipment. PMS is specifically tailored to your needs to give you timely inspections, qualified recommendations and expert field assistance with repairs to your equipment.

TECHNICAL TRAINING

CINCINNATI INCORPORATED offers a variety of Operator and Maintenance Training Programs to assist our customers in obtaining maximum value from your investment in metal fabricating equipment. With today's sophisticated CNC controls, operator knowledge and proficiency have a significant effect on overall productivity. These training programs also review many of the basics of metal fabricating, which may enhance the abilities of your newer employees. Please contact our customer Technical Training Department for further information.

CINCINNATI

CINCINNATI INCORPORATED

COPYRIGHT © 2003
CINCINNATI INCORPORATED